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To Coat Iron with Brass.

There are two processes by which this operation may be accomplished. One is to cleanse the surface of the iron perfectly from grease and oxyd, and then to plunge it into melted brass. The cleansing is best done first with a ley of soda, or potash and water; then placing the iron for a short time in weak sulphuric acid and water; the metal being bright may then be dipped into the fluid brass, and the thin coating of brass, thus adhering to the iron, may next be polished and burnished. The electrotyping process is however now mostly adopted by manufacturers. A solution of brass is first made thus :—Three quarters of a pound of cyanide of potassium, one and a half ounces of cyanide of copper, and three quarters of an ounce of cyanide of zinc, dissolved in one gallon of clear rain water, to which is finally added one and a half ounce of muriate of ammonia (sal ammoniac). This liquid is then to be used hot (not scalding, say 180° Fah.) in this manner. The iron to be coated is attached or connected with the zinc end of a battery of moderate power, and a piece of good brass is fastened in like manner to the opposite pole; both the metals are then to be immersed in the hot brassy solution, and there left undisturbed for such time as is deemed fit, and the iron will become coated with brass of a thickness according to the time it is left in the solution. Burnishing and polishing is afterward required, according to the nature of the work. The tone of color and texture of the brass varies with the temperature of the solution and quantity of materials employed, &c. By gas or other contrivance the liquid must be kept hot during the whole process. — *Septimus Piesse.*

A FRESH WATER SPRING AT SEA.—Mr. W. A. Booth, the coast pilot of the revenue cutter *Harriet Lane*, reports the discovery of a boiling fresh water spring at sea, off the coast of Florida. He says the spring is situated twelve miles, north by east, from St. Augustine, Fla., and eight miles off shore. It boils up with great force, and can be descried at a distance of two miles. When first seen it has the the appearance of a breaker, and is generally avoided; but there is no danger in the vicinity, as there are five fathoms of water between it and the shore. Ten fathoms of water are found to the seaward, but no bottom can be reached with the deep sea lead and thirty fathoms of line at the spring itself. The water in the spring is fresh, and is by no means unpalatable. One peculiarity about this phenomenon is, that when the St. John's river is high, it boils up from six to eight feet above the the level of the sea, and presents rather a forbidding appearance. This spring has doubtless deceived hundreds, who have hastily put about from, as they thought, imminent danger, and reported seeing a "rock with water breaking over it." The *Harriet Lane* has passed through it several times, and water has been drawn from it by a bucket thrown over the side, and when drank, no unpleasant taste or smell has been found.

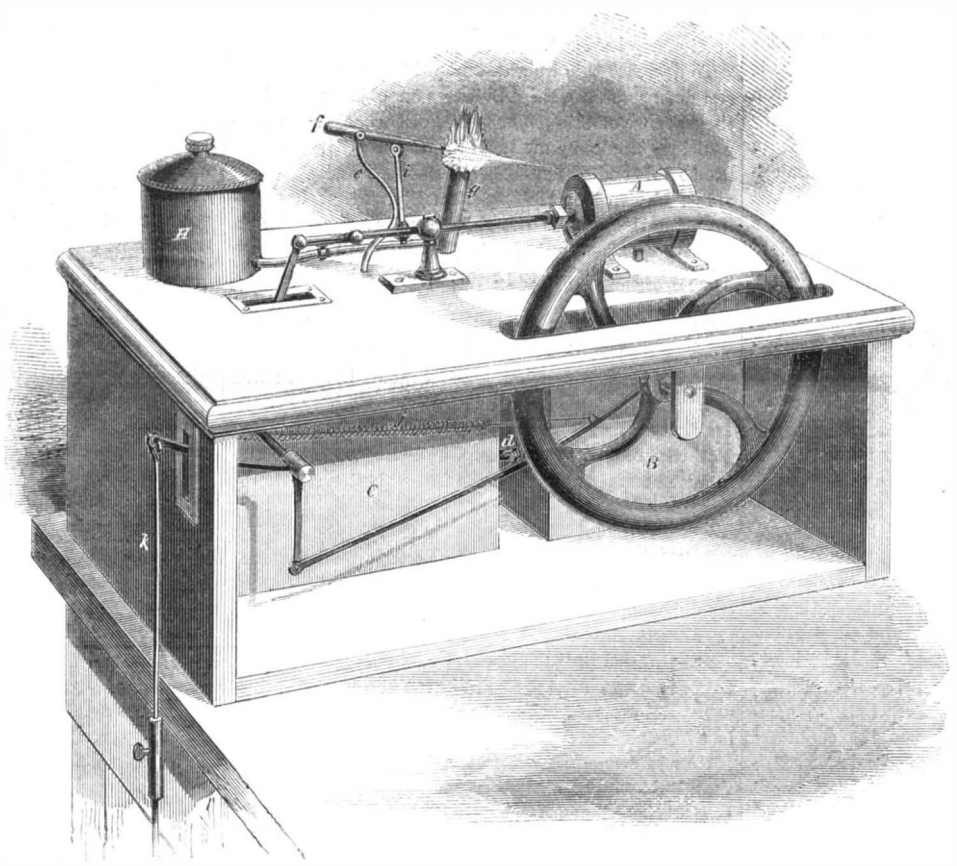
Improved Mechanical Blow-pipe.

The accompanying engraving illustrates an improvement in the arrangement of blow-pipes, the object of which is to make them readily adjustable to any situation, and to place the direction of the flame and force of the blast constantly under the control of the operator.

By means of a treadle, not shown in the cut, the double-acting air-pump, A, is operated to force air into the chamber, B, from which it passes into the chamber, C, by the small pipe, *d*. From the chamber, C, the air is led by a flexible tube, *e*, to the blow-pipe, *f*. The lamp, *g*, is supplied with alcohol, or other combustible, from the reservoir, H. The blow-pipe is connected to the standard, *i*, which supports it by a hinge joint, and this standard is joined to the table by a universal joint, which arrangement, in connection with the flexible pipe, *e*, permits the blow-pipe to be turned in any direction; and the standard, *i*, being formed of a tube and piston rod, allows the blow-pipe to be raised or lowered at pleasure. The elasticity of the air in the chambers secures a constant flow through the pipe, notwithstanding the intermittent action of the pump, and a stopcock in the pipe, *d*, enables the operator to regulate the amount of this flow with perfect accuracy to any quantity desired. To the connecting rod which intervenes between the treadle and the flywheel, is attached the spiral spring, j, at an angle, by which arrangement the flywheel is prevented from ever stopping on the center. The vertical rod, *k*, leading up from the treadle, is formed of a tube with a rod sliding into it, so that the length of rod, *k*, may be varied at will; the parts after adjustment being held in place by a set screw.

By this arrangement, it will be seen, the apparatus may be adapted to a table of any hight, and the flame may be varied in force and direction to suit the various needs for which it may be required. It has been in use some years, and is generally regarded as a remarkably convenient, compact and durable apparatus; easily fixed in any position, affording a constant and regular blast of any force required, and not liable to get out of order.

The patent for this invention was granted, through the Scientific American Patent Agency, Sept. 23, 1856, and further information in relation to it may be procured by addressing the inventor, S. B. Palmer, at Tully, N. Y.



PALMER'S MECHANICAL BLOW-PIPE.

SODIUM IN REFINING METALS.—Mr. Charles Tissier suggests a means of refining metals, especially copper, by the agency of sodium. The difficulty experienced in removing the last traces of sulphur, arsenic, phosphorus, carbon and silicum from the metals with which they are combined, is well known; often impairing their good qualities to a very great degree. The manufacture of aluminium has led to the production of sodium in large quantities, and it may now be obtained at a very moderate price. Sodium is admirably adapted to the ultimate refining of a good number of metals; the expense of employing it in the refining of copper, to the extent of a 200th part, which is an extreme quantity, would not militate against its use on the score of economy. Sodium acts by forming with sulphur, phosphorus and arsenic, alkaline sulphates, phosphates and arseniates, which rise to the surface of the metal in the form of scoriæ. The carbon and silicium are in their turn removed by the soda formed during the operation; and, in separating, the one forms oxyd of carbon, the other alkaline silicate. Antimony, bismuth and the analogous metals which have much more affinity for sodium than copper, form with it very oxydizable alloys, which produce a cupellation similar to that effected by lead: lastly, the oxydule of copper, which very often contributes to acidify this metal, is immediately decomposed by this energetic agent. The promptitude with which the vapor of sodium acts when passed through the metal in a state of fusion, leads to the idea that its employment will play a great part in metallurgy, and that it will greatly simplify the purification of cast iron, and its conversion into malleable iron.

WHEN ordinary saturated steam is superheated, its expansion for the first five degrees is three times greater than that of air.

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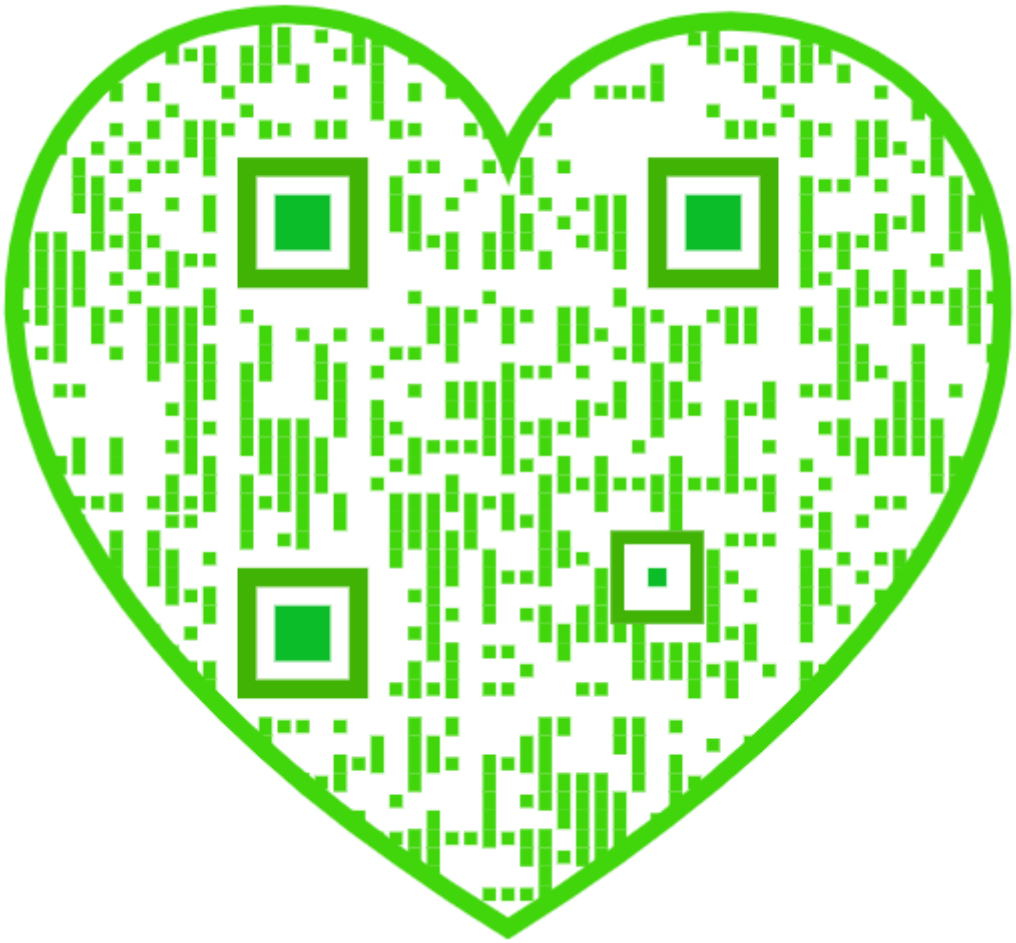

COMMANDER DAHLGREN ON IRON-PLATED SHIPS.

ORDNANCE OFFICE, U. S., NAVY YARD,
Washington, Dec. 10, 1860.

SIR—The earnest attention now given by naval authorities to the armature of ships-of-war, and the enormous expenditure which England and France are incurring in building ships of this description, induce me to recall the attention of the bureau to the suggestions made by me on this subject several years ago.

In 1852, after a series of practice upon the hull of the United States steamer *Water Witch*, principally with 9-inch shells at 500 yards, I made a report of the facts to the bureau, and, in conclusion, affirmed the possibility of guarding vessels against the dangerous action of heavy shells. The following passages may be referred to as more particularly applying to this subject:—

"These conclusions, when combined, are suggestive of the following propositions:

"1st. That the sides of a vessel may be protected by iron frames or plates as to make it nearly certain that shells will break by impinging thereon. The effect of the explosion will be almost nullified in this way."

"*Query.* Will the weight of the metallic material so used constitute a serious objection in view of the importance of avoiding the damage that may result from suffering the risk of a large shell's exploding in the frame or about the decks?

"Experiment will best determine this."

"2d. By interposing the coal stowed aboard steamers between the sides and the motive power, there is a very great probability that, in connection with iron ribs or plates on the sides, the boilers and machinery may be protected against any ordinary casualty from shells; at least during the period common to sea engagements."

"I need hardly enlarge on the great importance of enabling a steamer to overcome the objections so constantly urged against the vulnerability of her motive power."

"Whether the hull should be of iron solely, or of timber protected by iron ribs or facings, must be dependent on other considerations in connexion with those stated."

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"The formidable power of shells has long engrossed attention, and the tendency to their use is evidently on the increase. If only a moderate portion of their destructive effects be realized, there is every reason to look for more speedy results in sea engagements than has yet been witnessed; and it would be very desirable on many accounts to diminish, if possible, the capacity of this means of offence, particularly as regards sea steamers, the value of which has been materially affected by the liability of their motive power to derangement by projectiles; this consideration has exercised a controlling influence in the character of their armament, which is designed to operate at distances far greater than the pieces ordinarily found in broadside."

"So far as shells are concerned, even of heavy calibers, I am clearly of opinion that their destructive effects may be nullified, more or less, by the use of iron ribs or plates, and the proper disposition of the coal which every steamer has ordinarily at disposal."

"And if the results here truly represent those which will occur in the average, the motive power of a steamer will be exposed to no greater risk from shells at moderate distances than that of a sailing vessel, if indeed so much."

"It remains only to see how far the effects of shot may be neutralized," &c.

The means that I requested to complete the data necessary for the design of the armature not being furnished, and no notice being taken of any suggestions, the opportunity was lost to this country of initiating one of the most important inventions that has occurred in naval affairs, the idea of which was suggested by Paixhan in 1825.

If, however, the proposition was then too much in advance of the requirements of ships-of-war, it certainly is not now.

The introduction of new and very powerful ordnance by the United States navy in 1854 undoubtedly led foreign powers to the effort to obtain even more powerful pieces, and the rifled cannon are now about to share a place with the smooth bores, if they do not replace them entirely. It was natural that the defense should be desired to proceed *pari passu* with the offence, and metallic armature has been adopted. France proposed to build thirty such ships, but was content to begin with ten, in order to correct defects by experience.

England is also rapidly endeavoring to meet this emergency at a cost of two and a half millions per ship.

The United States must, of necessity, follow where she might have led.

The only vessel of the kind that has actually appeared at sea is the French *La Gloire*, and, though far from perfect, yet has she been so successful in the fundamental conditions as to make it certain that, with some very obvious correction, she will be equal to any necessity.

Whether it is best to follow the details adopted for this and other vessels of the kind constructed in England and France is by no means certain.

The character of their armature, which is the essential feature, contemplates the exclusion of solid shot, which, though not attained in all cases, is yet as nearly effected in the very great proportion of instances as can be useful, while shells, if not entirely neutralized, are rendered of little avail.

Now the iron sheathing used on the *La Gloire* for this purpose amounts to about one thousand tons. Of course the capacity of the vessel to carry ordnance, coals, &c., upon which depends the power of attack, and to keep the sea for any length of time, are proportionally lessened.

To decrease this weight, and yet to retain the material defense of the ship, becomes an object; and it is the purpose of this paper to suggest whether the propositions made by me in 1852 may not still contribute to this end.

1st. Use an iron ribbing *externally*, with such stowage of coal *within* as the ship permits; using also an interior arrangement of thin plates, calculated to give a harmless direction to projectiles, that is, from vital parts.

2d. These cannot prevent the entrance of shot, but they can be made to nullify shells, either by direct fracture, if round, or by glancing them, if from rifled cannon.

3d. Such armature need not exceed in weight one-half that of the present ship, and thus add some five hundred tuns to the capacity for coal, thereby doubling that now carried.

If there should arise any objection to the ribbing not now perceived, then I would recommend that the plated armature be reduced one-half in thickness, which, I apprehended, would not leave the hull open to a dangerous action from shells; for, as I have already stated in "shells and shell guns," the proportion of round shot or shells that glance is very considerable, even on wooden sides, while great force is lost from ricochet.

Now in long projectiles this is so vastly increased that it is obviously their weakest point, and can be used well for defense. A very little inclination serves to divert them, and on metal this would be the rule, while the ricochet is so abrupt and so uncertain as to detract largely from their action.

This plan would extend the sphere of such ships materially. Now, without sailing power and relying only on steam, it is obvious that they cannot go but a few days from their depots of coal, therefore can only be used in coast defense or cruising along shore.

But these more lightly clad steamers, carrying more coal and rising with greater buoyancy on the waves, will go further, and may even, accompanied by squadrons of screw coal-ships, pass to distant seas and there, by their speed, harass commerce, blockade harbors, and engage the heaviest ships that will venture to assail them.

Should the department be disposed to entertain the question, I would remark that the experiments, suggested in my report of 1852, would furnish some data for a more thorough examination of the subject, and which I should be much pleased to complete. The number of vessels belonging to the United States navy not of use now for other purposes being very great, some one might be selected which would render good service as a target for determining the details of this important problem.

I have already remarked that metallic armature for ships was proposed by Paixhan in 1825. It will be perceived, however, by reference to his work on shell guns, that the idea is presented without any definite force, and we are left to infer from such terms as *cuirasse en fer*, *armure solide*, *epaisseur en fer*, that he had in view a species of iron heating. Still it received no practical expression from Paixhan; indeed, he avers in one place (page 295) that too little is "known, elaborated, or proved," to allow of its use at that time, and that many questions were to be met before it could be applied to ships.

It remained then for others to give practical shape to the idea, and it is probable that Mr. Stevens was the first person to do so. Though this dates back some twenty years, it is yet not positively known how far he has succeeded in attaining the purpose, as the vessel he was constructing remains yet in an unfinished condition.

What practical development Mr. Stevens gave to the idea of Paixhan I have no means of knowing, except from the report of Commodore Stockton on the practice with his 12-inch gun, where he speaks of having fired at a target similar to that used by Mr. Stevens, which was covered with a plate of iron 4½ inches thick—a part of which, with the perforation made by the ball, has, I believe, been exposed for some time in the New York yard, near the gun of Commodore Stockton.

The project suggested by me in 1852, as already defined at page 2, was to use *ribs*, in connection with such a thickness of coal within as the case permitted; and as round projectiles were alone in vogue, I have no doubt that these, when properly arranged, would have been effectual.

If rifled projectiles are, however, introduced into the batteries of ships, this form of armature will no doubt be less effectual; and I therefore have now suggested the addition of interior plates, so that the projectiles which may reach them shall be diverted from the more vital parts; and in the inner bulkheads of the bunkers can be made to serve this purpose.

If, however, the ribbing should be found to be useless against the rifled projectiles, then I propose to substitute a system of smooth plates, *corrugated* or *grooved*, so as to take advantage of the glancing property of the rifled shot or shell.

It is, of course, needless for me to enter into details or dimensions, until there is some probability that the department desires to have a practical solution of the problem.

I have the honor to be, very respectfully, your obedient servant, JOHN A. DAHLGREN,

Commander in charge of ordnance department in yard.

Capt. George A. Magruder,

Chief of Bureau of Ordnance and Hydrography.

COPPER FIRE BOXES FOR LOCOMOTIVES.—The Pennsylvania Railroad Company have, for several years past, been using copper fire boxes on coal-burning engines, 22 of which were put in during last year. It is stated that the average duration of a copper fire box, using Pittsburg coal for fuel, has been five years; while the average of iron fire boxes is from 18 to 22 months. The cost of putting in a copper fire box, labor and material, is $910; deduct value of old material, when renewed, $230; making the net cost per engine, $680. The net cost for iron fire box is $479. As two iron fire boxes will not last as long as one of copper, there is a difference of nearly $300 in favor of the copper. The company are also making arrangements to test thoroughly the value of Gill & Co.'s patent as applied to locomotives, by which it is said the smoke and gas will be consumed, and the engine work more economically. If the experiments prove successful, they will be of great value to the railway interest.

NATURAL GRAPE TRELLIS.—While on a visit to West Chester lately, we observed in the garden of Mr. Jeffries a mode of training grape vines, which appeared to us worthy of note. A cedar tree, possessing a symmetrical form of branches, is selected, and when cut down, the branches are carefully preserved, thinning out the smaller twigs, but leaving the pyramidal shape prominent. This is used as a stake, and when covered with vines is highly ornamental, as well as forming a superior support for the grape. A row of them seen from a distance has the appearance of luxuriant tulip trees or sycamore maples.—*Farmer and Gardener.*

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HISTORY OF WATER GAS FOR LIGHT—FRAUDS AND PATENTS.

In the recent Annual Report of the trustees of the Philadelphia Gas Works, we find a brief and lucid history of the various efforts which have been made to manufacture and use water gas for illumination. As the SCIENTIFIC AMERICAN has attracted considerable attention from the peculiar information which has been published in its columns on this subject, we are certain that a condensed review of this report, so far as it relates to this particular topic, will be of very general interest to men of science and the public generally.

A committee consisting of ten gentlemen was appointed to report to the Select and Common Councils of Philadelphia, to inquire whether gas could not be made at less cost from other materials than coal, which is now used for this purpose. In their report, they state that they have examined the apparatus, and investigated three processes for making illuminating gas. The first is that of making gas from bituminous coal, or the common mode now in use; the second relates to gas obtained from wood by distillation. This process has been constantly used for several years in part of the Philadelphia Gas Works; the third is a gas obtained from the distillation of rosin and carbon in conjunction with the vapor of water, and called "water gas," which has lately, for some weeks, been manufactured at the Northern Liberty Gas Works. The Committee state, that good illuminating gas was made by each of these processes, so that the choice of any one depends upon its relative economy, convenience and certainty. The cost of the gas produced from wood is stated to be the lowest, but in view of the limited supply of pine wood, the committee deem it inexpedient to rely upon this material. They would not deem it prudent to suspend the manufacture of coal gas entirely, and obtain new apparatus throughout for wood gas, as a suitable kind of wood might greatly increase in price and become scarce. As it regards the water gas, the Committee state that they have not fully investigated the subject, but the "accounts" of the gas works show it to be no lower in cost than coal gas.

The engineer, John C. Cresson, Esq., in his report, has compiled from authentic sources the leading facts connected with the history of water gas. We are informed by it that the first patent taken out for a water gas for illumination, was in 1823, in England, by Wm. Vere and Henry S. Crane. The nature of that invention consisted in obtaining an illuminating gas, by admitting a current of water or steam into a retort containing tar, coal or oil, or other suitable material undergoing decomposition by heat.

Ten years after this (in 1833), and long after this patent had been abandoned as impracticable, a series of water-gas experiments was made by M. Jobard, Director of the Royal Museum of Industry at Brussels, and these were stated to be so successful, that a commission of the Royal Academy of Belgium was appointed to investigate the subject, and the result was a most favorable report. This discovery of Jobard led to one of the most disgraceful frauds ever perpetrated upon the scientific world. Prior to any publication being made of Jobard's experiments, he sold his invention to M.M. Selligue and Tripier, of Paris, and the condition of the sale was that Jobard's claim should be kept secret, and Selligue be proclaimed the inventor. Under the assumed character of the discoverer of water gas for illumination, Selligue received gold medals from the Paris Society of Encouragement, and the Academy de l'Industrie, and the process was introduced into several countries as his invention. It was patented in England by J. de ral Marino, and also in Austria by M. Offenheim. The latter person, in all innocence of his peculiar position, once endeavored to effect a sale of the new invention to the "original Jacobs" (Jobard) himself, who must have laughed in his sleeve at the joke. This water gas was put into actual operation for public use in the towns of Dijon, Strasburg, and Antwerp, and two of the faubourgs of Paris and Lyons. So complete was its apparent success, and so great was the influence of Selligue, that it maintained its credit, notwithstanding the opposition of several powerful gas companies, and a proposal was brought forward in the French Academy of Sciences for the award of its valuable gold medal to him for "his splendid invention," with a recommendation that the Cross of the Legion of Honor be also conferred upon him. Selligue stated to the Academy that he was able to obtain 55 feet of highly illuminating gas, for each pound of resin, while without its combination with steam, only 7 feet could be obtained. The matter was then referred to a committee or jury composed of Thénard, Gay Lussac, Brogniart, Darcet, Dumas and Payen—eminent chemists. Under their thorough investigations the bubble was exploded; the candidate for the honors of the French Academy was discovered to be an impostor, and his grand invention and himself soon shrunk from popular gaze. By Jobard's process, the water was first decomposed; the hydrogen was then mixed with a hydrocarbon, such as resin or oil vapor, and passed into a retort containing coke, maintained at a high heat.

Quite a number of patents was afterward taken out in Europe for water gas, but the public was not in any manner excited again upon the subject until 1847, when Stephen White, of Manchester, took out a patent, which, in its essential features, differed but little from Jobard's method. White's process attracted considerable attention for three years in England, and it was adopted in one or two towns, which have since abandoned it. This process was tried at the Philadelphia Gas Works in 1850-'51, and was in operation for several months. It was fairly tested, but did not yield such results as to warrant its adoption on a large scale. Gillard's French process of obtaining pure hydrogen gas by the decomposition of water, then burning it on a little basket of very fine platinum wire was also tried at the Philadelphia Gas Works in 1851. This was an ingenious and beautiful invention, but too expensive for common use. This is the water gas now in use at Narbonne in France.

A few years since, Mr. H. M. Paine, of Worcester, Mass., got up a water gas which created an intense excitement for some time in the community. It was pretended that water was decomposed at almost no expense by currents of magneto-electricity, and resolved entirely into dydrogen gas, which was rendered very brilliant by simply passing it through camphene, without any waste of material. Professional chemists were mystified and deluded, and the public press, with but few exceptions, became water gas mad for about nine months. The delusion at last passed away, to the great relief of many old gas companies.

The only American patents obtained for water gas apparatus and processes, are those of C. Brown, of Baltimore, Md., dated February, 1850; N. Aubin, Albany, N. Y., dated Sept., 1854; and Dr. Sanders, of Cincinnati, July, 1858. The claims of all these inventors are confined within very narrow limits. That of Mr. Brown is for producing gas from rosin, combined with a due proportion of water charged with carbon. Mr. Aubin's is for a steam generator, from which steam passes into the gas-generating retort. The patent of Sanders, as first issued, claimed carrying the mixed vapors of water and a hydrocarbon into a retort containing carbon, at a high heat. A re-issue of this patent was obtained in March, 1860, in which is claimed "the production of an illuminating gas by passing the vapor of water, and a hydrocarbon or its equivalent, mixed previously to decomposition, into a retort containing carbon, at a high red heat."

The foregoing is a brief history of the water gas inventions that have been patented and brought before the public. The processes of Jobard and White embrace all that may be considered scientifically meritorious in the whole list. The question of illuminating gas for public use is one of economy entirely. All things considered coal gas has proved to be the cheapest when manufactured on a large scale. If pure hydrogen gas could be obtained from the decomposition of water at a small cost, it would secure important benefits to the community, by employing it for cooking and heating purposes. Some new discovery may yet be made, which will accomplish such a result.

IRON ship building has been successfully commenced in Boston, Williamsburgh, Philadelphia, and Wilmington, Del. Messrs. Harland, Hillingsworth & Co. of the latter place, write: "Iron shipbuilding is steadily increasing; we have built 73 iron hulls, large and small. A first class iron hull costs no more than a wooden hull coppered. We now use American iron altogether, it being the best article manufactured."

Connecticut Freestone Quarries.

The brown standstone which is so extensively used for building purposes in our cities is obtained from three quarries at Portland, Conn. They extend along the river side a considerable distance. During eight months of the year, they employ about 1,200 men, with 100 yoke of oxen and 50 span of horses, with a fleet of 40 sloops and schooners, to convey the stone to market.

When these quarries first commenced, the stone hung shelving over the river; but they have been worked back nearly a quarter of a mile from the water. In the beginning of the past century, the people of the valley laid out a burial place which is now the very center of the quarrying operations. For a hundred years, the dead of the region have been carried there and laid in their quiet resting place, and all attempts to remove this sacred spot by the proprietors of the quarries have proved futile, and it is probable that it will be allowed to remain as consecrated ground.

From the top of the rock to the foot of the quarry, the depth is about 200 feet. The blocks taken out weigh from 500 cwt. to several tuns. The rocks are stratified, and are split in layers with wedges. The slabs are not cut with saws, like marble, but with chisel and mallet. These rocks are celebrated in geological records by the investigations of Dr. Hitchcock. In them he has discovered tracks of birds which must have been taller than the sons of Adam.

The substance of which these brown sandstones is composed was once as plastic as the mud on the shores of Long Island, and thither the huge sea foul resorted in thousands in search of their food. Their footsteps, imprinted in the soft clay which was left exposed by the receded tide, were hardened by the rays of the sun, and thus transformed into stony molds, which have conveyed to us a record of their travels thousands of years ago.

Manufacture of Chemical Substances.

The Paris correspondent—Jerome Nickels—of *Silliman's Journal* gives us some rather startling information respecting new discoveries in synthetical chemistry. He says:—

The most remarkable scientific event of modern times is the publication of a treatise on chemistry, proceeding on the same plan in organic chemistry as has been adopted for a century past in mineral chemistry; that is, forming organic substances synthetically by combining their elements by the aid of chemical forces only. The author who has performed demonstrations by this method is Berthelot, who has been occupied with organic synthesis since he first devoted himself to chemistry. Berthelot is not a vitalist; he is convinced that "we may undertake to form, *de novo*, all the substances which have been developed from the origin of things, and to form them under the same conditions, by virtue of the same laws and by means of the same forces which nature employs for their formation." Let us hasten to add a distinction upon which Berthelot properly insists and which it is necessary to recognize between organs and the matter of which they are composed. "No chemist pretends to form in his laboratory a leaf, a flower, a fruit or a muscle; these questions relate to physiology;" and it was by not observing this distinction that it was possible to form that school of medicine of which mention was made in my last communication, and which referred everything to vital force. This distinction being admitted, and calling to mind the syntheses recently effected, such as the direct preparation of $C_4 H_4$ from carbon and hydrogen, and alcohol from the union of $C_4 H_4$ and water, we may understand the possibility of performing for organic chemistry what has been done for mineral chemistry, and to give to it a basis independent of the phenomena of life.

"THE SPRIT" IN GINGER BEER.—As many temperance men are in the habit of drinking ginger beer under the impression that they are still "keeping the pledge," by abstaining from alcoholic liquor mixtuers, it may perhaps be as well to tell them the real truth, that all good ginger beer contains a notable portion of spirit. The more the beer is "up," the more certain is it that alcohol is present. It is well known that ginger beer is made with sugar, ginger, &c.; and that it is "set" to ferment before it is bottled; now, it is during the fermentation of the sugar that spirit is produced, and, to show its presence, it can be easily separated by distillation. In making this statement we do not wish to bias the opinion of any man, but merely to correct a popular error--the belief that ginger beer is free from spirit!—*Septimus Piesse.*

ANOTHER ELEMENT DISCOVERED.—The new mode of analysis by the lines of the spectrum is rapidly yielding fruit. Mr. William Crookes, of London, editor of the *Chemical News*, has just discovered by its means a new element, probably of the sulphur group.

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MACHINE ELECTRICITY — ELECTROTYPING—TELEGRAPHING—ELECTRIC LIGHT.

If we take the cast of any object in wax, we can make a most perfect copy of it in metal by preparing its surface with refined plumbago, and placing it in a solution of copper forming part of an electric circuit. This constitutes, in essence, the art of electro-plating, which is one of the most wonderful of modern discoveries. The electro current, in passing through the metallic solution, separates the metal from its aqueous solvent, carries it to the prepared wax cast, and makes it adhere to it in reproducing the same form with a minuteness of finish so wonderful that the most refined skill of the artist fails to rival it. Medals, plates of maps and pictures, and the composed type for printing newspapers, are copied in copper by the electro-plating process. Various articles of ornament and use are also plated with gold and silver. This is an art that now has become very general in its applications.

The electric current employed in electro-plating is usually derived from a galvanic battery composed of platinized negative and amalgamated positive zinc plates. All such batteries are disagreeable to use on account of their offensive odor, and they are defective in action, on account of the want of uniformity in the current, caused by the decomposition of the most oxydizable plates. A superior substitute for the battery, possessing the qualities of cleanliness, convenience and constancy of action, has long been sought by men of science and others. This at last appears to have been attained in an improved magneto-electric machine invented by Mr. George M. Beardslee, which we examined a few days since at College Point, L. I., in the establishment of Conrad Poppenhensen, Esq., of No. 44 Cliff-street, this city. It only occupies one cubic foot of space, yet it plates from five to thirty square feet of copper surface with a beautiful and tenacious deposit. The specimens of plated work which we examined were not mere experimental samples, but copies of medals, line engravings, &c., belonging to the establishment of Messrs. Smith, corner of Canal and Center-streets, this city, who are now doing their plating with this small machine as a superior and economical substitute for several batteries.

Before describing the peculiar mechanism, it will be more easily understood by first explaining the principles of magneto-electricity, and the elementary character of the mechanical organism in which it is developed.

When a piece of soft iron, surrounded by coils of copper wire is brought into or removed from contact with the poles of a magnet, electrical currents are developed in the wire. This is entirely a mechanical action. The galvanic battery produces its current of electricity by chemical action in the decomposition of the elements in the cups. By revolving a permanent magnet made of a bar of steel placed upon a spindle, so that its poles will be alternately brought into close proximity with and removed from the core ends of a pair of copper helices, we have a simple magneto-electric machine by which an electric current can be obtained from the wires of the helices by the mechanical action of a steam engine, water wheel, windmill, horse or man power.

We do not attempt to explain the cause of these phenomena, but the statement of the facts will at once impress the mind of every reader that electricity is the product of motion, whether caused primarily by chemical or by mechanical action.

The magneto-electric machine at College Point, L. I., is compound in its organization. It has six circular ring magnets, twelve inches in diameter, made of cast iron; each magnet has two poles—a North and South—and is composed of nine sections screwed upon a revolving shaft, like a series of spokes on a small broad wheel. Each magnet of the six on a ring is of a V-shape, the outer extremities forming the North and South poles. On the frame which sustains the shaft with its magnets, a metal ring is secured at each end. The twelve copper helices having cores of soft iron are fastened permanently in these rings, and the magnets revolve between them. Every time the poles of a magnet is brought near to and removed from the core of a helix, a current is developed in the wire. The helices and the magnets, therefore, resemble, in a measure, the cups and plates of a galvanic battery. There is a key for each helix in the ring, and all the terminal wires of the helices can be thrown into connection to direct all the currents in one regular continued stream into the circuit; or only two pairs may be used, according to the volume or intensity of the current required. The conducting wires from the positive and negative helices are all joined together and connected with plates in a long depositing trough a few feet distant, in which the casts and plates are to be copied. A small inch belt passing around a pulley on the outer end of the magnet shaft imparts rotation to it, and during this period powerful electric currents are regularly and rapidly developed in the wires. The deposits of copper thus obtained by such an electric current are tough, smooth and very uniform in texture, no matter how thick they are made.

Magneto-electric machines have been frequently tried for this and other purposes; but, so far we know, they have been practically unsuccessful. Several years since, we saw one about four feet in diameter which did not produce such powerful and regular currents as this little one, which appears to be a perfect substitute for the galvanic battery.

Wherever there is a steam engine or water wheel in operation, one of these small machines may be set up in a corner and used for telegraphing, either on long lines or in factories, without the care or trouble attending a galvanic battery. We were informed, but had no means of trying the experiment, that it takes about only one horse-power to drive half a dozen of such machines.

The great peculiarity of this improved magneto-electric machine lies in its cast iron ring magnets. These, we are assured, tend to develope more regular and powerful currents than bar magnets of much greater size. With a certain quantity of currents of electricity, and the employment of suitable solutions, various alloys of gold and silver, and also brass, may be deposited; but the action of a galvanic battery is so irregular that a uniform deposit cannot be secured, This difficulty may be overcome by the compound magneto-electric machine, as a constant current of any desired quantity can be obtained by shifting the keys. Hitherto, this has been considered an impossibility in a practical sense.

For several years past we have been expecting some new discovery for generating and applying electrical currents economically for the purposes of illuminating. Miniature suns produced by the electric light, throwing their beams far out upon the ocean from our lighthouse towers, or over whole squares in our cities from church spires, would certainly be an improvement upon our present system of artificial illumination. We hope that this improved magneto-electric machine may lead to such results.

Gas Companies.—The Manhattan Gas Company of New York, is the fourth in the list of the gas companies of the world. It is only surpassed by the Paris company and two companies in London. During the past year, the Manhattan company made 936,615,000 cubic feet of gas, and used 96,050 tuns of coal. It has 932 retorts in action, three-fifths of which are of clay; there are 288 miles of main gas pipe laid, and 9,132 public lamps supplied by this company. The average yield of gas is 9,750 cubic feet per tun of coal. At $2.50 per 1,000 cubic feet, the price of our gas, the company gets $24.27 for the quantity obtained from one tun of coal. It seems to us that the price of gas may be reduced to two dollars per 1,000 cubic feet, and at this rate it should afford ample profits to the company, and be a great benefit to the community.

Conclusion of Faraday's Lectures.—Our last number contained the close of Faraday's lectures on the "Chemical History of a Candle." A reperusal of these since their publication has impressed us more forcibly than ever with the skill displayed by the great philosopher in presenting the truths of science in an intelligible, and therefore interesting manner. We regard these lectures, amply illustrated as they are, as forming a very valuable feature in our current volume. We respectfully invite to them the attention of any of our readers who may have passed them by as they appeared.

A Wealthy City.—There are said to be in Liverpool over one hundred men who are each worth $5,000.000.

RECENT AMERICAN INVENTIONS.

The following inventions are among the most useful improvements lately patented:—

BABY WALKER AND JUMPER.

This invention, consisting in the employment or use of a support, provided with casters and adjustable yielding rods to which the child is suspended or attached by elastic cords, combines the following principal advantages above anything of the kind hitherto known:—It is not confined to one place, like those that are hooked in the ceiling and are always in the way, as its wheels allow it to be moved at pleasure—it can be lengthened or lowered just to suit the exact length of every baby—it being so light, as to allow a baby, no matter how feeble, to push it forward, thus teaching it to walk, and gratifying its ambition; it has double elasticity, there being spiral springs in the adjustable yielding rods as well as the elastic cords, and the whole forms a very elegant little piece of furniture. This valuable invention was made by W. J. A. de Brame, 707 Broadway, and patented April 16th, through our agency.

IMPROVEMENT IN LOOMS.

The first part of this invention consists in an improved shuttle-motion which is applicable with especial advantage to looms for weaving tape and other narrow fabrics, known as "narrow ware" looms. The shuttle driver in that class of looms is commonly operated by tappets, and the shuttles are consequently thrown with greater or less force, according to the speed of the loom, so that when the loom is working very slowly, the shuttles have not always force enough imparted to them to carry them through the warp; and the object of this part of the invention is to obviate this difficulty, and to drive the shuttle with the same force, whether the loom is working at a high or low speed. The second part of the invention consists in an improved self-regulating let-off, applicable with especial advantage to narrow ware looms, but also applicable to looms for weaving wide goods. The patentee of this invention is Thomas King, of Westchester, N. Y.

STREET-SWEEPING MACHINE.

This invention consists in the employment or use of an endless sweeping apron formed of brushes, scrapers, or rakes connected together and applied to a mounted box or wagon, in such a way as to admit of being adjusted above the surface of the street, and remain stationary when not required for use, and also to admit of being so adjusted as to be brought in contact with the surface of the street, and operated and moved so as to sweep up the dirt therefrom, and conform to the inequalities of the surface of the street, in order to perform perfect work. The further invention consists in the employment or use of pressure rollers, arranged and applied to the sweeping apron to insure a proper action of the latter on the surface of the street. The invention still further consists in a novel arrangement of mechanism connected with the bottom of the dirt receptacle for the purpose of readily discharging the contents of said receptacle when necessary. This invention was patented by Loughlin Conroy, of 235 West 35th street, New York city.

The Wilcox Air Engine in England.—The proprietors of this engine, which was illustrated in the Scientific American of March 16th, have received an application from Mr. Woodcroft, Superintendent of Patents in England, for one of these motors to drive the models in the Patent Museum. The rules of the building not allowing of steam, it is necessary to find a substitute not open to the objections which are made to steam. We understand that Messrs. Wilcox, Dennison & Taylor will immediately forward one of their engines, which will prove an attractive feature of the Museum.

Three of Wilson's stone-dressing machines and one polishing machine, illustrated on page 105, Vol. VII. (old series), Scientific American, are still in operation at Masterton & Sinclair's stone yard, Twenty-ninth street, East River, this city. They are employed for dressing Connecticut red sandstone, for which they are well suited.

Six fine screw steamships, five of which were specially built for the Arctic whale fishery, are now fitting out at Dundee, Scotland, for the Polar regions.

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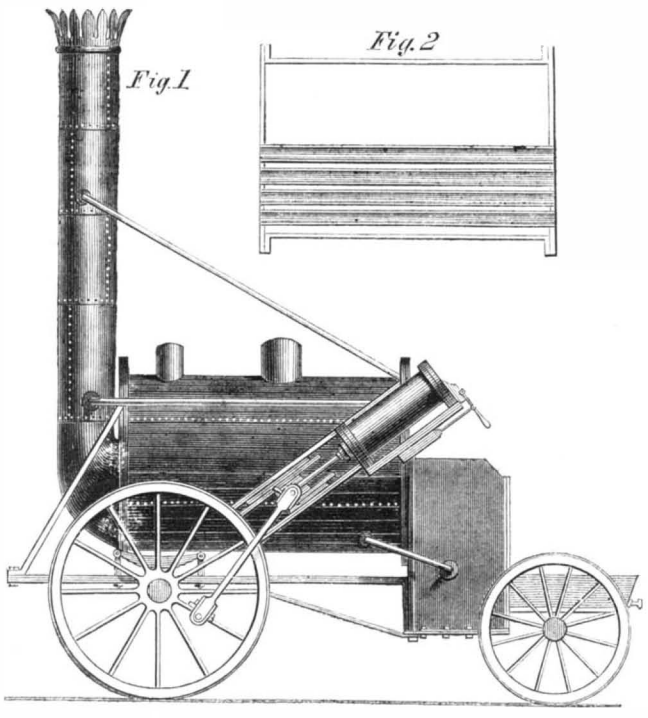
ROMANCE OF THE STEAM ENGINE.

ARTICLE XXI.

STEVENS—TREVITHICK—STEPHENSON.

Although Oliver Evans had most undoubtedly first pointed out the great advantages of high pressure steam and its application to propel carriages by engines, it must be admitted that we are as much indebted to the inventor of the multitubular boiler for our railway successes. This inventor was Col. John Stevens, of Hoboken, N. J., who obtained a patent in America in 1804, and in England in 1805, for the first tubular boiler of which we have any record. This boiler is represented in the accompanying figure—a section of the boiler. It was first applied by Stevens in 1804 to a small steamboat which he tried on the Hudson, with a stern paddle wheel and a rotary steam engine, the shaft of which was connected to that of the wheel. The arrangement was certainly most simple, but the engine was a failure. Stevens then took out the rotary and put in a small Watt engine, having a cylinder of 4½ inches diameter by 9 inches stroke. The boiler was 2 feet long, 15 inches in diameter, and it had 81 small copper tubes. The boat was 25 feet long and 5 feet wide. Repeated trials were made with this boat in the year above mentioned, and it had attained a velocity of four miles an hour. On one occasion, while the late Robert Stevens, Esq.—the inventor's more distinguished son—was making a trip between New York and Hoboken, the steam pipe gave way under pressure, it having been only soldered instead of riveted, but while this caused some consternation for a few moments, it did no damage. Another boiler was then made with vertical instead of horizontal tubes, and with it more steam was made, and the boat ran frequently, for about three weeks, at the rate of seven miles an hour. This little steamer was merely an experiment, but it was very successful, and it has always been a matter of surprise to us that Stevens stopped at this point until Fulton (several years afterward) fully established steam navigation.



At the present day the vertical, tubular boiler is the best for marine engines, and it is commonly used in our first-class steamships; the horizontal tubular boiler is commonly employed in locomotives. To John Stevens we are indebted for these most useful improvements which have become world-wide property.

Another eminent locomotive inventor was Richard Trevithick, of Camborne, Cornwall, who, in company with Andrew Vivian, took out a patent, in 1802, for an improved high pressure engine applicable to carriages. In Trevithick's boiler the feed water was heated by the exhaust steam, which some have supposed was an idea borrowed from Evans, but no proof has been adduced that the Cornish engineer had heard of the prior American invention. We therefore conclude that it was original with Trevithick, but he was not the first inventor. The engine of the two Cornish mechanics was applied by them to a carriage in which the cylinder was set horizontally, and both it and the boiler were set upon a frame behind two large driving wheels, and two small guide or trailing wheels were set in front. A fly wheel was fixed upon the outer end of the engine shaft; this was considered necessary, as there was only one cylinder used. A brake was employed to arrest the velocity of the fly wheel, when the carriage was descending steep hills as it was built for running on common roads. When tried upon the common turnpike roads it proved a failure, owing to the rough condition of the roads in those days. In 1804, however, Trevithick applied another engine and carriage upon the Merthyr Tydvil Railroad, and it was really very successful. This locomotive had an 8-inch cylinder, with a stroke of 4½ feet, so that it was quite a powerful motor. It traveled at the rate of 25 miles an hour and drew ten tons of iron in a carriage for 9 miles. The exhaust steam was thrown into the chimney. This engine was found to have too little adhesion on the rails, owing to its being very light.

To Richard Trevithick the world is indebted for the introduction of the steam engine on railways. His successful experiments soon led other engineers to apply steam to draw coals on several of the English tramroads. Quite a number of peculiarly-constructed locomotives were employed for drawing coals at a very slow pace, upon private railways, from 1811 to 1825, when a new era in engineering dawned upon the world. This was the opening of the Stockton and Darlington Railway, in England, for passenger traffic. The manager of this railway was Mr. Timothy Hackworth, an excellent engineer, who applied the blast pipe to the chimney, used a hot water feed box, flue boiler, and two cylinders, 11 by 20 inches stroke, placed vertically over the leading wheels. The engine had 6 wheels, 4 feet in diameter, and also had spring bearings. It was quite successful and ran at the rate of 10 miles an hour, drawing a load of 19½ tuns. A higher speed than this, however, was desirable; consequently when the Liverpool and Manchester Railway was to be opened, in 1829, it was at first contemplated to operate it with stationary engines, but before this was decided upon, prizes were offered by the managers for locomotives that could draw three times their own weight upon a level plane, at the rate of 10 miles per hour, the engine to consume its smoke, the boiler and mechanism to be supported on springs, and if the weight of it exceeded 4½ tuns, the carriage was to be provided with 6 wheels. Three locomotives were put in for competition on the day of trial, namely, the *Rocket* (illustrated in the accompanying engraving), built by George Stephenson, the *Sanspareil*, built by Timothy Hackworth, and the *Novelty*, built by Braithwaite & Ericsson. The *Rocket* had the tubular boiler of Stevens and the exhaust steam was carried into the chimney. The *Sanspareil* had a cylindrical flue boiler; the *Novelty* had its furnace surrounded with a water space; its flue was a long winding tube, three inches in diameter, passing three times through the boiler; it had but one cylinder, and it used a bellows blast. In the trial the *Rocket* was the only engine that accomplished the stipulated distance of 70 miles; its average speed was 13.8 miles per hour, and it attained, for a short distance, a velocity of 29 miles per hour. The news of this trial was soon blazoned through the world; it gave George Stephenson a prestige in building locomotives, which cast all other engineers entirely in the shade, and from that moment he began to ascend the throne of "The Railway King," a title which has often been given to him, and which, we think, was not undeserved. The rapid development of the railway system dates from the successful trip of the *Rocket* at the opening of the Manchester and Liverpool Railway, on the 6th of October, 1829.

George Stephenson was one of the most remarkable men that ever lived. He was 18 years old before he learned to read, and was then only an engine tender in the Newcastle mining district of England. Still he afterward rose to be one of the greatest civil engineers, and the very first of locomotive engineers. He was crowned with wealth and honors nobly won; he associated with princes and nobles, but never felt vain of such distinctions, as he mixed in dignified friendship with his old cronies to the last days of his life. He died of an intermittent fever, at Tapton, England, on the 12th of August, 1848, at the age of 67 years. A statue of him stands in St. George's Hall, Liverpool, and another at the railway station in Euston Square, London.

IMPROVEMENTS FOR THE TIMES—SUGGESTIONS TO INVENTORS.

In these days of steam fire-engines and superheated steam we wonder if some of our ingenious people cannot invent a *steam field battery or cannon* that will furnish its own motive power and do its own shooting.

Can electro-magnetism be usefully employed for the purposes above indicated?

A new and more formidable battle weapon than any now known is greatly wanted. All patriotic inventors have here an opportunity of doing their country good service.

The invention of a ball and bomb proof vessel, of eight feet draft, small size and simple construction, is wanted.

Is it possible, without injuring their efficiency, so to modify or improve artillery carriages and military baggage wagons, that they may be drawn upon railroad tracks? If this can be successfully done, an important economy in time and in the expense of transportation might often be gained in the movement of military forces.

Improvements are needed in machines and methods for the *expeditious construction* and supply of cannon, fire-arms, munitions, and all kinds of articles required by soldiers.

Soldiers generally suffer much from exposure, especially at night, and in such cases where they have to sleep in the open air cannot a device be invented which is easy to carry, and capable of keeping a man warm in a cold night?

Particular attention should be paid by inventors to improving the conveyances which serve to carry the wounded from the battle field. The ambulance wagons, as now in use, are altogether insufficient in a bloody battle, and in the late war of Italy loads of wounded soldiers had to be carted away in ordinary ox-wagons.

THE AMERICAN FLAG GOING UP.—The mission of science is one of peace, but, as neither science, peace, nor any other valuable interest can exist except under the supremacy of the laws, when the question came of either maintaining or destroying the government, we promptly determined to hang out our banner upon the outward wall. We accordingly sent out a messenger to purchase the bunting, and he brought us a list of the prices; but before we could procure the blocks, cords, &c., these prices, so active was the demand, advanced more than one hundred per cent! Over all the broad land, north of Mason & Dixon's line, the glorious old emblem is again given to the breeze, and thousands of sturdy freeman, who have learned to respect the rights of others and to maintain their own, are marshaling to its support!

UNION EMBLEMS AND BADGES.—The all-pervading spirit of patriotism so expressively called forth among our citizens displays itself in the demand for emblems of various descriptions to be worn on the person, either as articles of jewelry or as badges. Those which present any attractive novel characteristics are sold very rapidly. We will remind our readers that such articles, when possessing novelty of design, are proper subjects for patents under section XI. of the new patent law.

CANADIAN INVENTORS.—The Patent Office has decided that Canadian inventors may apply for patents as heretofore upon payment of $500. We sincerely hope that the Canadian Parliament will speedily amend their patent law.

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Gum-Resins.

This is a general term that has long been employed to designate a peculiar class of substances which partake partly of the nature of gums and resins. The name does not really express their nature fully, but its use has been long sanctioned by custom, and it is perhaps the best which can be employed.

Gum-resins are vegetable products, formed by the thick juices which exude spontaneously, or by means of incisions, from the stems, branches and roots of certain plants, and they consist of resin, gum, essential oil, starch and a small quantity of inorganic matter. They are solid, generally opaque and brittle, and often have a strong smell and acrid taste. Water partially dissolves them, forming an opaque liquid; while alcohol takes up a portion of them, forming a transparent fluid. Being partially soluble in water, and partially so in alcohol, the name "gum-resin" has been considered not altogether inappropriate.

Gum ammoniac is among the oldest and best known of the gum-resins. It is obtained from the inspissated juice of the plant *Dorema Ammoniacum*, a native of Persia. It generally attains to a hight of about 7 feet, with a stem of about 4 inches at the base. The whole plant is abundantly pervaded with a milky juice, which exudes with the slightest puncture made at the ends of the leaves. It is commonly found in agglutinated masses, of an amber color on the surface, and is opaque. It is moderately hard, but becomes soft with moderate heat, and gives out a peculiar odor; its taste is bitter and nauseous.

A few drops of the hypochlorite of soda, added to an alcoholic solution of gum ammoniacum, gives a peculiar red color, obtained by no other resin; hence, this is usually the chemical test employed to detect this substance in alcoholic solutions. According to analysis, this gum-resin is composed of resin, 68.6; gum, 19.3 per cent, some essential oil, gluten and water. It is principally used in medicine, being taken internally for chronic pulmonary affections; and it is also applied in the form of plasters to the joints of persons afflicted with rheumatism. When mixed with a strong solution of isinglass, it forms a cement for broken porcelain.

Asafœtida is also an old and well-known gum-resin, and is obtained from a plant which grows in Persia and Northern India. Its odor is so delightfully pungent as to have acquired for it the classic name of "Satan's excrements." This term is certainly eulogistic, and may account in a measure for its extensive use in medicine. It is employed as an anti-spasmodic, and is sold in large quantities by druggists in the form of alcoholic solutions.

Many persons who are subject to fits carry a piece of this gum-resin constantly about them, and inhale its odor from time to time for the purpose of preventing sudden nervous prostration. There is no accounting for tastes and smells among some people; the Norwegians steep asafœteda in their whiskey, and revel on it as a delightful cordial. It it composed of resin, 48.5; gum, 19.0; volatile oil, 4.5 per cent.

Gamboge is a gum-resin which has long been employed as a yellow water color in painting. It is also employed in medicine as a remedy for constipation; but if taken in excess it is a poison, and no antidote is known for it. It comes from Ceylon, and is the hardened juice of a plant. It contains 72.5 per cent of resin, and 19.9 of gum.

Myrrh is a well-known gum-resin repeatedly mentioned in the Bible, and it was known as an article of commerce 1729 years before the Christian era. Its name, according to ancient writers, is derived from Myrrha, the daughter of the King of Cyprus, who, after committing many criminal acts, fled to Arabia, where she was transformed into a tree which ever afterward bore her name. This substance is now mostly imported from the East Indies. Its color is a pale reddish-yellow; its form is irregular large tears, and it is semi-transparent. The odor of it is fragrant, but its taste is bitter. It contains 27.80 per cent of resin, 54.38 per cent of soluble gum, and some essential oil. It is employed only as a medicine; it is useful in disordered conditions of the digestive organs, in excessive secretions, and in tincture as a gargle for ulceration of the throat.

Olibanum is the ancient frankincense which has ever been much employed in religous rites. It is a gum-resin obtained from a tree growing in the mountainous parts of Caromandel. Its color is a pale yellow; it occurs in the form of tears, and contains resin, 56.0 per cent; gum, 30.0; volatile oil, 8. When burned, it emits a fragrant odor, which arises from its volatile oil. It was once considerably used in medicine, but is not at present; for fumigation, however, and as incense in the services of the Romish church, it is still extensively employed.

Galbanam is found in commerce in large masses of irregular size apparently formed of agglutinated tears. It is obtained from Syria, but from what plant is unknown. As medicine, it is taken internally for colds and chronic rheumatism. It is composed of resin, 66.86; gum, 19.28; and 6.34 volatile oil.

There are several other gum-resins, such as Bdellium, Euphorbium, Opaponax and Sagapenum, which have been used in medicine, but are now almost obsolete. All of the gum-resins contain a volatile oil, which gives them the peculiar odor for which each is distinguished. But while we have described the comforting nature and use of these peculiar substances, so far as they are known, chemists have to confess that much ignorance still prevails respecting them, and all believe that there is a broad and extensive field—almost virgin—still open here for chemical research.

Dynamical Effect of Falling Bodies.

The subjoined results are experiments which were made with a view to determine the dynamical effect of bodies falling freely, with the accelerated force due to gravitation:—

Rules regarding the momentum of falling bodies having for a long time failed to satisfy scientific men of their accuracy, Mr. Chas. H. Haswell, whilst occupying the position of Engineer-in-Chief of the United States Navy, was led to an investigation of the subject, assisted by a series of experiments, the results of which afford very conclusive elements for the construction of the necessary formulæ to apply them to practice.

The principal instrument used for the purpose of determining the effects was a spiral spring weigher, which, by the attachment of spring pawls on the sides of it, delicately retained in ratchets, was retained in its compression; and from an index, sliding over a scale graduated to half pounds, the results were enabled to be accurately registered. The weights were of lead, elongated in their shape; the cords to which they were fastened were of hemp, made of loose strands, which afforded great flexibilty, and the distances were determined from the centers of gravity of the weights.

It will readily be seen that by this arrangement of pawling the spring, the weights at their last impacts were in nowise retarded in their full distance, and as they could not possibly fall beyond it, the full and exact measure of their force was always obtained.

With a view to simplification and facility of comparison, units of spaces were first decided upon, and the relations due to them were then determined by the formula $\sqrt{s}\,2\,g$; s representing the space fallen through, and g the velocity acquired at the end of the first second, *i. e.*., 32.166 feet.

Weight of falling body, in lbs.	Space fallen through, in feet.	Velocity acquired at end of fall in feet per second.	Dynamical effect as indicated by instrument, in lbs.
.5	.5	5.67	12.5
.5	1.	8.02	17.75
.5	2.	11.34	25.
.5	3.	13.89	31.
.5	4.	16.04	36.
.5	5.	17.93	40.
1.	.5	5.67	25.
1.	1.	8.02	35.5
1.	2.	11.34	50.
1.5	.5	5.67	37.
1.5	1.	8.02	53.
2.	.5	5.67	50.
2.	1.	8.02	71.5

NOTE.—With a view to the attainment of all practicable accuracy, the entire experiments were repeated three times, and in each case the weights were made to fall until the limit of impact had been clearly obtained.

A careful inspection of these results will demonstrate, first, that the dynamical effect or measure of impact is directly as the velocity acquired; and second, that one pound falling through a space of one foot, and having a final velocity of 8.02 feet per second, has an impact of 35.5 lbs. These elements, then, readily furnish a formula by which the measure of this force, M, may be correctly arrived at, and which is—

$$M = v\,W\,4.426.$$

v = velocity at end of fall in feet per second, and W = weight of falling body in pounds. From which, to obtain the weight required for a given impact and hight of fall, we have by inversion—

$$\frac{M}{v\,4.426} = W$$

It must be understood that the above experiment were not made with the idea of arriving at the ultimate measure of impact of a falling body, as such as result is held to be impracticable of observation, inasmuch as, theoretically, it is infinite, and, experimentally, unattainable, without involving an expenditure unauthorized by the benefits to be derived, as the laws determining the effect of falling bodies is sufficiently understood to render an illus tration of their operation unnecessary. The purpose of the experiments was simply to give a measure by which to estimate the effect of a pile driver, or any similar instrument, wherein the elasticity and crushing of the materials composing the instrument, and the pile itself, are such as to set aside ultimate attainments of impact.

Frauds in Enameled Leather and Morocco.

The attention of purchasers of enameled leather, the principal kinds of which are sold by the square foot, is directed in the *Shoe and Leather Reporter* to frauds that are commonly practised upon them by some leather dealers, in which they are cheated at the rate of from 5 to 12 per cent of the quantity of leather which they suppose has been purchased. Hides being of an irregular form, they are supposed to be difficult of measurement, and the way the fraud is perpetrated is described as follows:—

Let us suppose a person wants to buy some enameled hides. He calls on "A," looks at his stock, is told the price is 15 cents, and that the hides will average 60 feet, when in fact they will actually measure but 56. He then goes to "B," whose leather seems to be much the same in quality as "A's," and is told the price is 16 cents, and that his hides will average 56 feet, which is honest measure; now, if the buyer is willing to believe that all manufacturers of leather are alike honest, he will of course say, "I can't buy of you, Mr. B, as I have been offered leather apparently as good as yours at 15 cents; besides which it averages four feet larger, which is quite an object with me, particularly with such as is wanted for carriage work."

The person will of course make his purchases of "A" (although he pays just four cents more per each hide than "B" asked), and will congratulate himself that he is a sharp buyer, and conclude that "A" is a liberal man while "B" is an extortionist who is robbing his customers by his enormous profits; when in fact the purchaser himself is being robbed by the very party on whom he is bestowing his patronage.

The above is no imaginary case, but is what is occurring every day; nor is the amount of fraud exaggerated.

Apropos to the above we add another most cunning and scientific fraud perpetrated in the most respectable manner upon leather purchasers. The price of morocco dressed sheepskins range from $2.50—the lowest—up to $8.50 per dozen, whereas genuine morocco (goat skins) range from $5 up to $23 per dozen. The difference in the quality of the two classes of skins is very great. Dealers in dressed skins—both jobbers and those who purchase for making them into bindings and shoes—can generally tell a morocco dressed sheep from a goat skin, because the natural grain of the two is so different. A most complete imitation of goat skin, however, has lately been put upon sheepskin by obtaining large copper electro-plates of genuine goat skins, and using these for die-plates upon which sheepskins are laid and submitted to pressure. A perfect resemblance of genuine goat skin is thus imparted to sheepskin, and the most skilled dealer is unable to detect the fraud. We have been informed that such skins are sold daily for genuine morocco.

THE ship *Ericsson* has been lying at Greenpoint for two years past, and may now be seen there. The model of this vessel is beautiful, and the hull is constructed in a very superior manner. It appears to be unwise to allow such a fine ship thus to rot away at the dock. Would it not pay to take out her present small engines and put in a pair of large overhead beams, like those of the *Vanderbilt?* It ought to make a good coasting steamship.

COLONEL GOWEN, the American contractor at Sevastopol, states in a letter published in the London *Times*, that he will have the harbor nearly cleared during the present year. He has been very successful in his undertaking; there are only eight vessels now to be raised. He has been presented with a beautiful gold snuff box by the English government for repairing the English cemetries in the vicinity of the city.

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Correspondence

Practical Directions for Making Bread.

MESSRS. EDITORS :—A great deal has already been said about bread-making, but very little of any practical use to the world. I think one good receipt given to housekeepers, would be more to them than all the theory you could publish in a month. Very few women ever try to understand why bread becomes light, or how carbonic acid is set free in the dough.

My plan for making bread is this :—Take about eight or ten middling-sized potatoes (good mealy ones), pare and cut them very fine ; then set them on to cook, with about three times as much water as will cover them. When done, mash them fine in the same water, then add flour enough to make a thick batter. Remember the flour must be put in while the water is boiling hot, let it then cool off until about luke warm, and then add a little piece of sour dough, say a teaspoonful to start with. Of course after the housekeeper has once made this yeast, she can always keep a little of the old to add to the new. If kept in a warm place, it will be fit for use in about six hours. If it stands long enough to get sour, a little soda may be used. Add plenty of this to your flour, and you will have the lightest and best tasted bread that you could wish for.

A LADY.

Wisconsin, March 29, 1861.

Visit to See the Water Gas at Malden.

MESSRS. EDITORS :—I had supposed that the able report of Mr. Seely upon the Sanders gas, which appeared in your columns a short time since, would have satisfied most people of the fallacy of the so-called improvement. But it seemed by a letter from Dr. Sanders, in a late number of the *Gaslight Journal*, that this was not so, "that the gas was in practical use and operation ;" and "that by a visit to either Aurora, Ind., or Malden, Mass., all doubt upon the question might easily be dispelled."

Being near the latter place lately, I thought it worth my while to see a water gas demonstration, and I went to the works, but found that clay retort and soft coal made coal gas, while the branch of water gas retorts were quite cool. On inquiry, I was informed that the works were built under the superintendence of Mr. Place, of Philadelphia, and Appleton & Graham, of Boston, that they had been fixed up three times, and the results were so unfavorable, that the coal was again resorted to. E. L. NORFOLK.

Salem, Mass., April 15, 1861.

Great Opening for Enterprise at La Crosse.

MESSRS. EDITORS :—There is a very fine opening in our town for the establishment of numerous kinds of business. Steam flouring mills, barrel machinery, tub and pail manufactory, furnaces, shops for making reapers, threshing machines, and other implements ; tanneries, paper mills, potteries, manufactories of stoneware, drain pipes and tiles, and many other kinds of industry, would find here abundant and profitable employment. One hundred reapers were sold in this town last season. There are extensive pineries and valuable iron mines in the vicinity.

We are poor, but honest, and not short-sighted, and will give every gentleman coming here the best advantage possible. KADISH & BARROW.

La Crosse, Ind., April 13, 1861.

THE three Jonval turbine wheels now being built at the works of I. P. Morris & Co., for the Philadelphia Water Works, under the plans of E. Geyelin, the engineer, will be the largest in the world, we understand, when completed. The draft iron box of the wheels will be 8 feet long and 12½ feet in diameter, and the wheel will be 9 feet in diameter. The number of horse-power of the wheels when the tide is out will be 230 ; when the tide is in, 110. Each wheel is to drive two double-acting pumps, 18 inches in diameter and 6 feet stroke, and the water is to be raised 125 feet in the stand pipe. The three turbines are calculated to raise 50 per cent more water than all the water wheels now in operation at Fairmount, or about 16,500,000 gallons per day.

The Principal of the Gyrascope Governor.

We see that some New York correspondent of the *London Artizan* has got his head muddled in the effort to understand the simple little piece of mechanism invented by Allen Anderson, of Lancaster, Ohio, for regulating the speed of marine engines, and very properly named the "gyrascope governor." This novel invention was illustrated on page 193 of our last volume. Our readers will remember that it is based on that action of inertia which tends to confine a rotating disc to one constant plane of rotation ; the same power that holds the gyrascope suspended at the end of its axle. The writer spoken of asserts that Anderson's governor operates simply on the same principal as Silver's and other ball governors, that is, by the principal of centrifugal force. It is difficult to conceive that any person intelligent enough to get a letter into a respectable mechanical journal could be so stupid and unsound in his criticism.

American Street Railway in London.

Our countryman, George F. Train, has astonished the cockneys by his American go-a-headativeness. Near the close of the last year, he obtained a charter from the authorities in London, to lay down a street railway between Bayswater and Marble Arch—he gave an implied promise that he would have it completed by the first of April. This promise was thought to be rather rash ; but it has been more than fulfilled. The road was completed and opened to the public on the 23d of last month, two weeks before the period promised. The event was celebrated with a public banquet, at which speeches were made by distinguished Englishmen, and Mr. Train delivered himself of one that was peculiarly American, but well adapted for the occasion and the place. He gave statistics of the great progress of street railways in the United States, pointed out their advantages, and set forth clearly the benefits that would result to the cities in Europe that adopted them.

CURE OF DRUNKENNESS.—There is a prescription in use in England for the cure of drunkenness, by which thousands are said to have been assisted in recovering themselves. The recipe came into notoriety through the efforts of John Vine Hall, father of Rev. Newman Hall, and Captain Vine Hall, commander of the *Great Eastern* steamship. He had fallen into such habitual drunkenness that his most earnest efforts to reclaim himself proved unavailing. At length he sought the advice of an eminent physician, who gave him a prescription which he followed faithfully for seven months, and at the end of that time had lost all desire for liquors, although he had been for many years led captive by a most debasing appetite. The recipe, which he afterward published, and by which many other drunkards have been assisted to reform, is as follows : "Sulphate of iron, five grains ; magnesia, ten grains ; peppermint water, eleven drachms ; spirit of nutmeg, one drachm ; twice a day." This preparation acts as a tonic and stimulant, and so partially supplies the place of the accustomed liquor, and prevents that absolute physical and moral prostration that follows a sudden breaking off from the use of stimulating drinks.

DIANTHUS HEDDEWIGI.—Since our notice of this new floral beauty on page 212 of our present volume, we have had many letters inquiring where the seeds can be procured. To accommodate our fair readers who feel interested in the Heddewigi, we would state that a small package of the seeds can be obtained of Messrs. Thorburn, seedsmen, John-street, this city, for 25 cents. We have examined a lithographic picture of the flower and pronounce it fine ; but whether the seeds will produce a stalk of mullens or the blooming dianthus we are unable to say.

THE beautiful drab sandstone which is now coming into extensive use in New York, comes from Dorchester, Nova Scotia, in blocks weighing about five tuns. It differs from most other sandstone, in not being stratified. It is very homogeneous and close in the grain. It is sawed into slabs, in the same manner as marble, after it arrives in this city.

THE English government has expended $10,000,000 in the preliminary experiments and in the manufacture of the Armstrong gun.

Water as a Fuel in Making Iron.

The use of water as a fuel is now attracting a great deal of attention throughout the world. We translate the following from the *Revue Universelle* :—

The vapor of water has already been utilized in metallurgy as an agent of oxydation in the roasting of certain minerals, particularly to facilitate the separation of the compounds of antimony and arsenic in metallic sulfurets. For several years, attempts have been made to employ the calorific power of the hydrogen contained in water ; and it is in the same line of invention that Messrs. Maire and Vallee have sought to utilize water as a combustible in industrial furnaces, and particularly in metallurgic operations. Water, fed in a regulated and intermittent manner into a hot fire, is decomposed into oxygen and hydrogen. The combustion of the latter, in presence of the atmospheric air (the oxygen of the water being employed in burning the carbon), produces a considerable heat in addition to that of the principal combustible. There results then a considerable augmentation of caloric without any addition of combustible, and, consequently, a more rapid fusion of metals and minerals, and an economy of fuel which the authors of the process state varies from 40 to 50 per cent. *Experiments and calculations have demonstrated that the heat absorbed by the decomposition of water is less than that furnished by the combustion of the gaseous products of the water decomposed.*

The following is the manner in which Messrs. Maire and Vallee propose to apply their method to metallurgy. For a blast furnace, the water is led from a reservoir under a pressure of 1½ atmospheres in a pipe from 4-10ths to 6-10ths of an inch in diameter, which enters the tuyere at right angles at a distance from its end varying from 10 to 40 inches, and thus the water is blown, in the form of spray, into the center of the fire.

We have strong doubts of the truth of the above statement which we have italicised, notwithstanding the high authority on which it is made.

GREAT FAMINE IN INDIA.—The news from India is frightful in the extreme ; "famine is devastating the country." The London *Times* of the 29th ult., in an article on the subject, after alluding to the fact that the famine is created by drought, says :—"It is a drought in a land where the sun bakes up the soil almost to the hardness of pottery, and where the earth, without rain in the accustomed season, is an impenetrable crust. Where irrigation works exist the scanty waters will suffice to produce scanty crops, but where there are no such works there is no vegetation to be found. Mr. Edmonstone, the Lieutent-Governor of the Northwestern Provinces, had himself seen that, in a march of twenty miles, there was not a green blade in any direction. Families were fleeing away from the death which threatened them. Emaciated multitudes were drooping and dying by the way. And all this, we are told, is but the beginning of the terrible calamity which threatens to involve a population reckoned by one of the speakers at the Mansion House at seven millions and a half. Of these, it is stated, two millions and a half are actually starving."

TANNING STATISTICS.—In a communication to the *Shoe and Leather Reporter*, J. M. Kiersted, Jr., states that, during the operation of tanning, conducted for six years at Mongaup, Pa., the average quantity of leather made with one cord of hemlock bark was 145 lbs., and the average cost for tanning 1 lb., was $5\frac{22}{100}$ cents. The cost of the bark per cord was $3.05. During these six years 92,522 hides were tanned, from which 2,988,464 lbs. of leather were made. There were 20,547 cords of hemlock bark used. The leeches for extracting the tannic acid of the bark are heated with steam, and the spent bark is burned for fuel. The expense of tanning with hemlock is continually increasing, as the bark is becoming scarce and the price is advancing.

TEMPERING STEEL ROLLERS.—In hardening steel rollers, they are liable to crack when suddenly plunged into cold water. To prevent this result, their surface should be covered with a paste made of flour and powdered prussiate of potash, and then dried. They should now be raised to a low red heat in a clear fire, then plunged into the cold water. They come out perfectly hardened, and if the operation is carefully performed they will not crack. In hardening articles of steel, the cracking of them is most generally caused by heating to a rather high temperature before plunging into cold water. The above process will steel the surface of iron journals, such as those of wagon axles.

THE bottom of a well-coppered timber ship outlasts three tops, according to Sir Howard Douglas Upon these principles, common wooden ships ought to be coppered all over.

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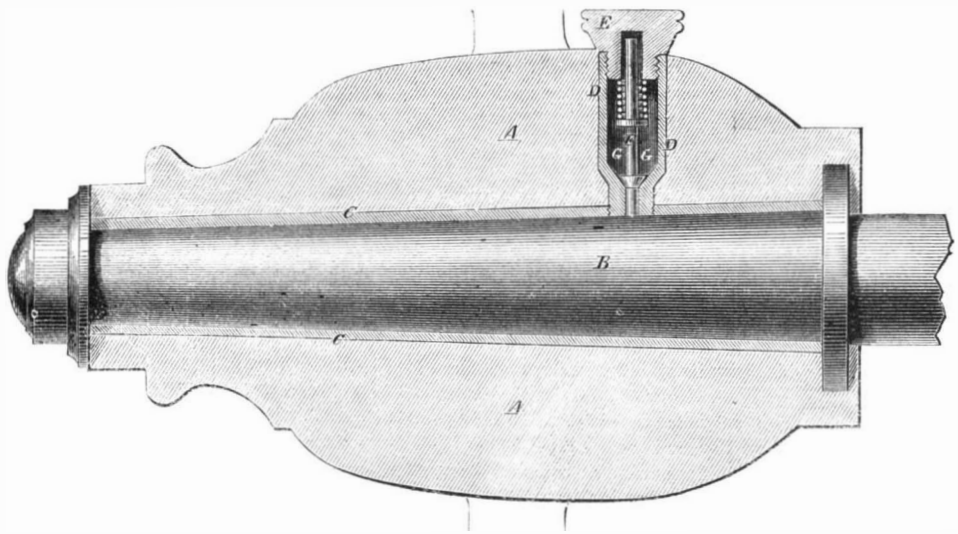
Patent Axle Lubricator.

Who that has ever used a carriage, and had it to oil, has not experienced the trouble and annoyance of the dirty job of taking off the wheels when the axles need lubricating? Many boxes are made with a chamber to hold the oil; but this does not answer the purpose desired. The impure oil from the wheel runs into the chamber, and it soon becomes so thick and dirty that the mixture ceases to lubricate. But the accompanying cut represents an ingenious device invented by J. E. Emerson, which is very cheap, simple and efficient, and by which the four wheels of a carriage or team wagon can be oiled in less than one minute, without removing the wheels.



EMERSON'S PATENT AXLE LUBRICATOR.

The cut is so plain and simple that it scarcely requires an explanation. A A is the hub of a wheel, B the axle, and C C the iron box; D D is a wrought iron tube passing through the hub, and screwed through the box; E is a thumb screw, which is silver washed and serves as an ornament to the wheel; G G is a reservoir in which the oil is kept, and when it is desired to let a portion through upon the spindle, B, this is very easily done by unscrewing the thumb screw, E, thus raising the valve, F, and after a few drops of oil have passed through, the valve is closed by turning down the thumb screw, E. The reservoir, G, will hold sufficient oil to last from one to two months with a carriage in constant use.

This device may also be employed for lubricating bearers in machinery in many situations.

The patent for this invention was granted through the Scientific American Patent Agency, on April 10, 1861; and further information in relation to it may be obtained by addressing Emerson & Silver, at Trenton, N. J.

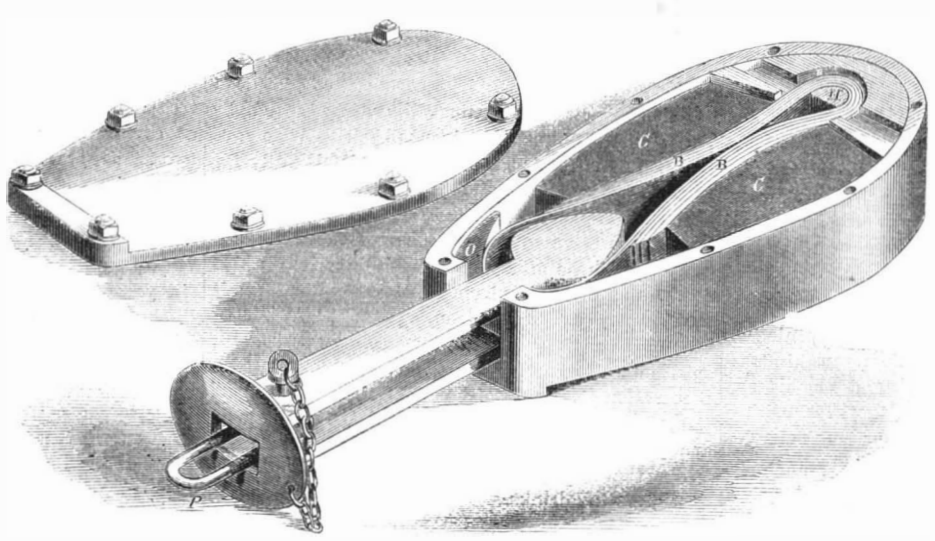
DIVISION OF LABOR — EXTENDED SCIENCE.—The period is not long past when a single professor used to embody in himself all that was known of several languages and the sciences in general; but these days are gone forever. With our vast increase of knowledge, general science has of necessity been subdivided into many distinct branches, each of them requiring a lifetime of personal devotion and effort to master. Two hundred years ago, the barber was a physician in ordinary, and the blacksmith a dentist extraordinary; but now medicine and surgery are divided into several distinct and great professions, and it is the same with chemistry and all the other practical sciences. A man's life is too short now to master even a branch of some of the sciences.

Submarine War Vessels—Diving Apparatuses.

The Munich correspondent of the New York *World* of April 11, describes an apparatus for submarine explorations, invented by William Bauer, a Bavarian engineer. He makes out a long and somewhat touching story about the adventures of this inventor—how he had traveled from court to court in Europe, and had endeavored in vain to gain the patronage of the French and English authorities.

The invention is described to consist of a close cylindrical chamber with windows on the bottom, a chamber to contain compressed air; and it is moved under water by a propeller. In short, it is a submarine propeller, just such an apparatus as is illustrated and described on page 172, Vol. VIII. (old series), SCIENTIFIC AMERICAN. It is stated to have been exhibited before Professor Liebig and other learned men in Munich; also, the American Consul in that city, and these gentlemen had been favorably impressed with its merits. The apparatus may be very useful, but it is not new.

It appears to us that a good submarine propeller would be very effective, if well managed, for blowing up blockading ships in a harbor. Fulton invented the submarine torpedo to destroy British war vessels, but it never was successfully applied. An efficient submarine propeller for war purposes has not yet been invented.



RODMAN'S IMPROVED CAR BUMPER.

Improved Car Bumper.

The accompanying engraving represents an improved car bumper, invented by Mr. A. H. Rowand, of Alleghany City, Pa., which is claimed to possess the following advantages over those in ordinary use: First, great simplicity, rendering it more durable and less likely to get out of repair, as well as more easily made by the tools to be found in any railroad workshop; second, dispensing with india-rubber, which, besides its great cost, is objectionable from its property of becoming rigid in cold weather; and third, the constantly increased, and great final resistance which it presents, diminishing the shock even of collisions.

The nature of the invention consists in providing within a case or box a series of metallic springs, so arranged as to operate with a lateral pressure on opposite sides of a wedge-shaped bar, and so arranged as to allow said bar to press its wedged-shaped end between the opposing and lateral pressure presented by said springs, the resistance of the metallic springs being increased by india-rubber or other springs placed on the outer sides of the metallic springs, and between them and the sides of the box or case in which the whole is secured. The general form of the springs, and the mode of fastening the same; also, the general form of the wedge-ended bar, by which the springs are operated, and by which, by means of movable link in the front end, the coupling to the next car is effected, are all shown in the annexed engraving, which represents a perspective view of the springs, pads, coupling bar, with its wedge-shaped end, when not covered. L L L L represents the frame or case inclosing the springs, M M, the bearing in which the several leaves of the metallic springs is bedded and fastened by the bolt, H, passing through and entering the nut, C. B B are the leaves of the principal spring. C C are additional pad springs, placed to aid the springs in opposing the entrance of the wedged-ended bar, A. O O are pad springs or cushions near the front end, and inside of the box or case, to assist the main springs when the car is drawn forward by the power in advance of it. A shows the general form of the connecting bar with its bumper head and loose link, P, for coupling to the next car; also, its wedge-shaped end, which operates on the main springs in its forward and backward motion.

The inventor is very confident he has the best bumper ever invented, and we are not prepared to deny it.

The patent for this invention was granted January 1, 1861, and further information in relation to it may be obtained by addressing the inventor, as above.

PECULIAR PHENOMENA OF RUHMKORFF'S COIL.—The spark of induction from Ruhmkorff's coil has been deeply investigated by M. A. Perrot, who has published his researches in the *Annales de Chimie*. He concludes that the spark which springs from the induced wire, when the inductive current is interrupted, enjoys at once the properties of tension, specially characteristic of the static state (frictional electricity), and of quantity, characteristic of the dynamic state (voltaic electricity). The spark may be divided into two parts, exhibiting the respective properties. The jets of fire he believes to be due to secondary phenomena of the static state. M. Perrot has also shown that the vapor of water may be decomposed by discharges of the direct current of the Ruhmkorff apparatus; that the spark of induction exhibits much more chemical power than the ordinary electric spark; and that currents of gas or vapor may be advantageously employed in determining the chemical actions of these sparks. A current of carbonic acid gas, submitted to the action of the spark of induction, gave 200 cubic centimeters of a mixture of carbonic oxyd and oxygen in less than an hour. The decomposition of the gas ammonia was still more energetic.

M. CHEVREUL has laid before the French Academy of Sciences a memoir in continuation of his elaborate chemical researches on dyeing. It relates especially to the intervention of chemical affinity in the operation. After detailing experiments with various dye stuffs, he comes to the conclusion that they "demonstrate that an electric affinity exists between the different coloring principles and the different stuffs, wools, silk or cotton." Many modern chemists, on the contrary, attribute the phenomena of dyeing to the physical adhesion of the dye stuff to the fabrics. M. Chevreul refers to the great advantage he has derived from the supply of specimens of flowers (above 15,000) from the gardens of the Museum of Natural History, and to the able assistance given him by the Director of the dyeing establishment at the Gobelins

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MILITARY AND NAVAL INVENTIONS.

The inventive faculty of the country, roused to extraordinary activity by the intense mental excitement pervading the community, will now be directed to an unusual extent to improvements in implements of war and in all mechanism connected with naval and military operations. Of the thousand elements in this broad field of invention, the most prominent at the present time are rifled cannon and the iron plating of ships. The two great military powers—England and France—after expending hundreds of thousands of dollars in experiments, have adopted both of these important improvements; while our own government, which, notwithstanding its peaceful policy, usually occupies the front rank in the quality of its small army and navy, is strangely behind in the movement.

The rifle cannon of the French army are loaded at the muzzle, while the British government has adopted the breech-loading gun invented by Armstrong; though, since the recent astounding revelations in regard to that famous weapon, it is probable that its use will be abandoned, and the British government also will adopt the simpler pieces which are loaded at the muzzle. A great deal of attention has been given by English inventors to the forms of the rifle grooves; whether they should be rectangular, triangular or rounded—whether they should be broad or narrow, few or many, &c.; and many of these points remain entirely unsettled.

The plating of ships too, notwithstanding the fact that both nations are expending millions of dollars upon these shields, is regarded by the most intelligent English engineers as still open for experiment and improvement. A great deal of discussion has been expended upon plans for making the sides of the ships which were to bear these plates sloping; it being ascertained that a much thinner plate is required to turn away a shot striking at an angle, than will resist a perpendicular impact. It is easy to conceive of numerous modifications of this idea by which inclined plates will be offered to the reception of the shot. One plan invented in England is to have the plates fastened upon independent floats, to be carried by the sides of the ship; and the intellect of the nation seems to be teeming with an endless variety of ideas in connection with the subject.

But the rifling of cannon and the plating of ships are only two of an innumerable multitude of details connected with naval and military mechanism. The shot, the wad, the cartridge, the lock, the gun carriage, the cartridge box, the tent and tent equipage, the cooking apparatus, preserved meats and other provisions, and, in short, everything relating to the operations, the armaments and the supplies of navies and armies will be examined with eager scrutiny, by both comprehensive and acute intellects, in earnest efforts to make some improvements, either in their general plans or in their minute details.

It is very important for the country to have the military operations carried on with the greatest possible efficiency; and all of these inventions which are really valuable ought to be promptly adopted. It is impossible for the responsible officers of the government to devote their time to examining the various schemes offered; and we would suggest to the administration the appointment of a competent commission for this purpose. There can be hardly a doubt that such a commission, if the members were properly selected, would contribute immensely to the efficiency of our naval and military operations, and would save its expense to the country a thousandfold.

EXCITING QUESTION—WORKING STEAM EXPANSIVELY.

We really seem to live in the midst of perplexing uncertainties in science as well as politics. Thus the working of steam expansively in engines has been more or less practiced for three generations, and it has been universally believed that a great saving in fuel has been effected by this practice. Engines have been constructed everywhere, and operated in the full confidence that this was the right way in steam engineering, and that every other way was wrong. But a bold writer steps out and challenges the engineering world on this question, and he has been appointed Engineer-in-Chief of the United States Navy. Mr. Isherwood gave the results of several experiments with steam to the public two years ago, in his second volume of "Engineering Precedents," and the recent steam trials at Erie, Pa., brief accounts of which have appeared in our columns, have somewhat startled the engineering world, as they strike at the very root of opinions long and generally entertained respecting the economy of expansive steam. The government report of these experiments has just been published. It is signed by chief engineers Isherwood, Zeller, Long and Stimers, who were appointed to conduct them, and they appear to have done their duty carefully and with decided ability.

The vessel selected to test the relative merits of expansive and non-expansive steam in cylinders was the *Michigan*, a government paddle-wheel steamer lying at Erie, Pa. The larboard engine only was used, and it was employed in exerting its power to paddle the water aft while secured at the dock. Each experiment lasted 72 consecutive hours, during which the engine was neither stopped nor slowed down, nor in any way changed in condition. It was always operated several hours, so as to get the steam to the same pressure, the fires in proper order, and all things adjusted correctly before each experiment was actually commenced. The water in the boiler was gaged, and the quantity fed in was accurately measured. Every pound of coal fed into the furnaces was carefully weighed; indicator cards were taken, and everything arranged to insure accuracy. The results of seven experiments cutting off at $\frac{1}{1}$ $\frac{1}{2}$ $\frac{7}{10}$ $\frac{4}{9}$ $\frac{3}{10}$ $\frac{1}{4}$ $\frac{1}{6}$ $\frac{4}{45}$ths of the stroke are given in a tabulated form. Five of these were performed with Ormsby bituminous coal, and the other two with anthracite and Brookfield coal. The pressure in the boilers above the atmosphere was 195 lbs. the lowest; 22 lbs. the highest. The quantities of water consumed were 39.942 lbs. per total horse power, cutting off at $\frac{1}{1}$ $\frac{1}{2}$ stroke 30.881, at $\frac{7}{10}$; 29.416, at $\frac{4}{9}$; 30.592, at $\frac{3}{10}$; 29.841, at $\frac{1}{4}$; 30.715, at $\frac{1}{6}$; 32.044, at $\frac{4}{45}$. These are important items, demanding careful scrutiny.

The water fed into the boiler was carefully measured in a tank, and it was found that just in proportion as expansion was extended, there was a proportionally greater loss of steam in the cylinder by condensation—a great deal more steam flowed into the cylinder than was accounted for by the indicator. Thus cutting off at $\frac{1}{1}$ $\frac{1}{2}$ of the stroke the loss was 2.91; at $\frac{7}{10}$, 6.60; at $\frac{4}{9}$, 18.14; at $\frac{3}{10}$, 33.07; at $\frac{1}{4}$, 30.84; at $\frac{1}{6}$, 33.66, and at $\frac{4}{45}$, not less than 37.16 per cent not accounted for. The conclusion arrived at is in essence, that so much condensation takes place in the cylinder by the cooling action of expansion, that no economy results from using highly expanded steam. It is true that somewhat more power is developed in the same cylinder by expansion, but by using smaller cylinders, proportioned to the power required without expansion, the economy is on the side of non-expansion, both with respect to fuel and the cost of machinery.

In conjunction with the publication of this report, engineer Stimers, one of the Board, has also published an article on the subject in the *Journal of the Franklin Institute*, in which he gives the substance of the report, and confesses that he is a convert to the non-expansive practice, as being the most economical. He states that he was taught that the indicator diagram was an exponent of the economy of the engine, and that when the experiments commenced he had little doubt of the result, and believed Mr. Isherwood to have been mistaken in his former experiments. He states that James Watt made all his engines to cut off at three-fourths of the stroke, and for sixty years the firm of Boulton & Watt have made all their engines in this manner; they have never constructed them to use highly expanded steam. He believes that Watt early made experiments, and found out the most economical method of working steam, but kept it to himself. These steam trials are the first of their class ever published, so far as we are aware, and what new light has been thrown upon the question by them, the credit is due to Chief Engineer Isherwood. We have given the leading results of these experiments, and while we commend them to the attention of engineers, they do not appear to settle the question whether steam can or cannot be employed with more economy when highly expanded than when used at full stroke, or with moderate expansion.

To this subject, presenting another view of the question, we will briefly recur next week.

ARRIVAL OF MAJOR ANDERSON AND THE GARRISON OF FORT SUMTER.

Never in the history of our country has New York been more deeply moved than during the past week, and the feeling of patriotism seems to be growing daily more deep and strong. The news which vibrated on the electric wires relating the capitulation of Fort Sumter, sent a thrill through the heart of the whole people, and the call "to arms" was heard resounding on every hand. On Thursday, the 18th ult., two thousand volunteers from old Massachusetts marched in the forenoon through our streets on their way to defend the capital of the Union, and the people poured out in masses to greet them. Again, in the afternoon, Major Anderson, Captain Doubleday, and the other officers, with the capitulated garrison of Fort Sumter, arrived in the steamer *Baltic*, and this raised the feelings of the people to a still more elevated pitch. On the mainmast of the *Baltic*, the flag which waved on the fort was displayed, and at the foremast was the flag which once streamed from Fort Moultrie. Major Anderson was received with enthusiasm. A large crowd gathered in front of the Brevoort House, where he put up, and where his wife and family have lately been residing, and the welkin was made to ring with cheers. Thousands of our most prominent merchants and others called and paid him their respects. The city appeared almost like a waving forest of flags. The Star Spangled Banner floated from a thousand staffs; it streamed from every window, the bosom of almost every lady and gentleman was adorned with the Red, White and Blue, national colors, and every heart seemed charged with love to "the flag of our Union forever."

WINDAGE IN CANNON.

In order that a cannon ball may be pushed down the bore of a gun, it is necessary to make it a little smaller than the bore, and this difference in size is called windage. The proportion of the explosive force of the powder, which is lost by the gases through this small space, is surprising to all who are not familiar with the rapid flow of gases through small openings under a high pressure. We have known a cotton mill, driven by a steam engine, the cylinder of which was 12 inches in diameter, and 3 feet long, running 60 strokes a minute; the steam pipe leading from the boiler to the cylinder was 3 inches in diameter, and in this pipe was the throttle valve connected with the governor; the usual opening of this valve was only *one-fourth of an inch*, and through this narrow space all the steam flowed to fill the cylinder 120 times per minute! This engine was generally run with a pressure of about 90 lbs. to the inch, but the pressure of gases in a cannon is some 25,000 lbs. to the inch, and the rapidity with which gases flow increases with the pressure. These facts enable us to understand the great loss of the propelling power of the powder by the windage. This loss always forces itself upon the attention of practical artillerists, and many efforts have been made to prevent it. In small arms this is accomplished perfectly by swedging the bullet, by means of a driver and mallet, into the bore and riflings of the gun completely air-tight, but the cast iron shot used in cannon cannot be swedged like a soft leaden bullet. Most of the inventions which have been made for the purpose of preventing the escape of gases by the windage, consist in surrounding

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the shot with bands of lead, generally to be pressed out against the sides of the bore by the force of the powder. These bands are apt to fly off from the shot, and in the recent fighting in China, so many of the British outlying riflemen were killed by the leaden fragments, that it was found necessary to withdraw the Armstrong gun from service, and supply its place with the old-fashioned field pieces.

There is an entirely different plan for preventing the loss of the propelling power of the powder by the windage which might be worth investigating—the introduction of some sort of wad between the cartridge and the shot which would be driven forward by the explosion, and pack the space around the shot. For instance, how would it do to bend a thick piece of india-rubber hose, and cement the ends together, so as to form a smooth ring about the size of the bore, and fasten this to the outer, or upper end of the cartridge? Perhaps the ring might be made thin on the upper side and filled with water, so as to burst with the explosion, and wash out the gun!

A STRANGE, A SOLEMN, A STIRRING SIGHT.

We sit at a window that commands a view of the City Hall Park, and all the public buildings located thereon. We can traverse with the eye that busy thoroughfare, Broadway, from Barnum's Museum to *Stewart's marble palace, while beneath our windows runs along Park-row one of the most busy streets in* the city. From morning until night, the whole spectacle is one of extraordinary activity, probably unsurpassed by any other locality in the world save that in the vicinity of the Bank of England. From this window we have witnessed many imposing sights, one of the most recent being the magnificent military display in honor of the visit to this city of the Prince of Wales.

The strangest, and, in all respects, the saddest and most stirring sight of all, was that which met our view on Wednesday and Thursday of last week. For the first time, we saw large bodies of armed men moving down Broadway in response to the call of the Federal Government, stating that the national flag had been struck to the dust by those who were once its friends, and required to be vindicated against further assault at the hands of a rebellious organization.

Following the attack upon Fort Sumter, and the threat of the Secretary of War of the Confederate States that the flag adopted by them should wave over the capitol of the nation, the whole North is thoroughly aroused, and such enthusiasm to uphold the honor of the flag has never before been witnessed in this country since the days of Washington. The great conservative city of New York comes to the rescue of the government in this its hour of peril with astonishing alacrity, and will pour out its men and money like water to uphold the Federal authority.

It is indeed sad to see brethren of the same country rushing to arms against each other; but the heart of even a traitor or a coward cannot but feel a throb of brave and loyal devotion to see the call of the government so promptly obeyed. The flag is the emblem of our national existence, and no loyal citizen will consent for a moment to see it disgraced and dishonored. The President has called for 75,000 men, and it is estimated that before the first of July, *two hundred and fifty thousand* will be ready; indeed, there can be *one million* of brave men armed for the support of the government within a few months. New York city alone will furnish 50,000 of as good fighting men as ever entered the field.

It is also fearful to contemplate a struggle involving as it must, so much loss of life and property on both sides. The Southerners are a brave people, and will fight earnestly now that they have commenced. The Northern people are less impulsive, but when fully aroused, are also a brave and enduring race, and will not lay down their arms until compelled to do so by force of numbers.

The Federal government evidently considers its authority supreme, and will enforce it at all hazards. The Scientific American has not been guilty of promoting sectional strife, but it cannot be disloyal to a constitutional government that has always been so kind and forbearing to all the States which, previous to the revolution, precipitated by the secession of South Carolina, were all in a happy and prosperous condition. This hasty act has brought upon us all our troubles.

COTTON AND WAR.

Our country has entered upon a mighty struggle, and if it continues long, it will probably strike a deathblow to the preëminence of the cotton-producing States in the supply of that staple. This has been apparent from the start, and cotton planters have assured us of their well-founded apprehensions that should secession be followed by war this result would be inevitable.

The English cotton spinners have already lost confidence in the stability of the cotton supply of this country, and are using every exertion to increase it in other sources where it can be cultivated in great abundance. The latest intelligence from England states that already the cotton cultivation in India is going forward with great activity, and it is well known, from recent authentic information that *more cotton is absolutely cultivated in Africa than is raised in the American Cotton States.* Under the influence of Thomas Clegg, agent of the Manchester Cotton Supply Association, who resides at Abbeokuta, in the Yoruba district, the supply of cotton shipped from the port of Lagos is rapidly increasing—all that is needed is commercial and mechanical facilities, which capital can supply, and a system of organized labor to produce and prepare it for market.

A colony is now organizing in this city under the charge of the Rev. Henry Hiland Garnett, an able and energetic minister of the Presbyterian Church, this city, who will soon proceed to Abbeokuta with colored mechanics and machinery and other implements necessary to found a colony there. A liberal treaty has already been formed with the king, and he promises the most ample protection and support to the colonists. This is no idle scheme—it is in the hands of some of the shrewdest and wisest men in the city, and will be pushed forward with zeal and fidelity.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported for the Scientific American.]

The usual weekly meeting of the Polytechnic Association of the American Institute was held, at their room, in the Cooper Building, this city, on Thursday evening, April 18, 1861—Professor Mason in the chair.

PROJECTILES AND NAVAL WARFARE.

Captain Bartlett stated that the report of the discussion of projectiles in the Scientific American had attracted the attention of General James, who had addressed to him (Captain B.) a letter, dated April 14th, at Providence, R. I., inclosing some extracts from an official report of a board of army officers, stating the results of some experiments with General James' projectile. That report says:—

A target 16 feet 4 inches wide, 13 feet high and 39 inches thick, made of well seasoned, very hard white oak timber, was placed directly in front of the middle of the 2,000 yards distant target, having its face 15 feet in advance of it. This butt was composed of three thicknesses of timber, each stick 13 inches deep and 11½ inches wide, the front and rear tiers being upright and the middle one horizontal. . . . The penetration into the butt of solid, seasoned, hard white oak was as follows:—With 8 pounds of powder, four direct hits, a penetration of 33, 39, 41 and 45 inches respectively; three richochet hits, a penetration of 6½, 13 and 14½ inches respectively; with 10½ pounds of powder, one direct hit, 39 inches penetration."

The letter stated that the direct hit with 10½ pounds of powder passed clean through the target, as if it had been constructed of pine plank instead of the toughest oak. A set of photographic views were exhibited, showing the hits of 10 consecutive shot from a 47-pounder gun throwing 82-pound shot. In explanation of the penetration beyond 39 inches, it was stated that the shot "went into and nearly through the oak strap in the rear, cutting off one of the 1¼-inch bolts, and going many yards beyond." In reference to the objection to the packing used in this projectile, "the observations of the board led them to the conclusion that there is no more force in this objection than will apply to the sabots of fixed ammunition, or the junk wads of heavy cannon." The report concludes that this projectile is admirably adapted to the various calibers of guns now in use, which may be readily rifled without removing them from the forts and arsenals, besides doubling their range and effectiveness, and lessening the strain. The longest range of an 82-pound shot was 4,374 yards (over 2½ miles), and the deflection was only 24 inches. Captain B. believed that if Major Anderson had been provided with these shot he could have destroyed the floating battery in 10 minutes. The fact that nobody was hurt by Major Anderson's shot, if true, was the most conclusive proof of the perfection of military engineering; for he fired with the utmost care and deliberation, until he had but three barrels of powder and three cartridges left. In fact, he did not surrender, but evacuated on the terms proposed on the 11th ult. It appears, however, that Major Anderson's shot did tell on Fort Moultrie, the very place where it would be most likely to, where some forty were killed and one hundred wounded. The recent experiments by Dahlgren did not justify the inference, in Captain B.'s opinion, that General James' projectile was a failure; only that it might be improved.

Mr. Dunham said that some 18 or 20 years ago he made several projectiles, under direction of Mr. Stevens, having the same object in view that seemed to be more perfectly, if not successfully attained by General James' shot. There were three curved wings at the rear of the projectile somewhat like propellers, which produced a spiral motion. The shot was charged with powder, which was ignited by explosion by concussion. One of these shot was fished up in the bay and brought to the city some 15 years ago, and, while *the man was examining into it, it exploded.* Mr. D. was not able to state whether that kind of shot operated with anything like the exactness now obtained by rifling the cannon. The difficulty with lead as a packing was that, after using it for 30 or 40 hours constant firing, it adhered to the inside and obstructed the loading. There was also danger from increased friction causing heat, and a consequent strain of the metal. Relying upon the reports and statements that he had just heard, he believed that General James' shot was a more efficient projectile with our present ordnance, as mounted on the forts and ships, than anything yet known. There never were and never would be two guns of large caliber bored exactly alike, because of the different and varying density of the metal. Our ordinary cannon could be rifled, and would then be as good as if they were originally so constructed. With regard to the opinion expressed by Captain Bartlett that, with these projectiles, the floating battery could have been destroyed in ten minutes, he must differ. A five or six inch plate, at an angle of perhaps 25° or 30°, would effectually resist all known projectiles. The best form of projectile to be used against an iron shield, he believed to be in the shape of an engineers's punch—flat at the forward end if it could be always sent directly forward; if not, slightly parabolic.

Captain Bartlett said that it was conceded that an 8-inch plate of iron was impenetrable to any shot in present use. At Fort Sumter, the iron embrasures of 8-inch iron were not penetrated.

Mr. Stevens inquired at what distance General James' shot would do execution.

Captain Bartlett said they had been used only for horizontal firing, but they could certainly be thrown further than any bomb.

Mr. Butler—Would they not strike sideways at great range?

Captain Bartlett—That is not my observation; at a distance of 2,400 yards I could not detect any change.

Mr. Butler—It is said that, in the Crimea, the wounds caused by the Minié ball, instead of being small openings as by the ordinary ball, were elongated rents.

Captain. Bartlett attributed that effect to the size and shape of the ball, and not to any deviation of the point before it struck.

The President stated that, several years since, a rifle was ordered to be manufactured by the War Department, called the Lyman gun, with three successive charges and explosions. Experiments showed that an inch ball was fired through 60 inches of hard wood, and that the range was four miles. One of these guns burst at the first charge. The results of modern science in warfare seemed to be that the strongest and most available force must conquer at last, and that with comparatively little bloodshed.

Mr. Nash remarked that if Major Anderson had had 300 more men in the fort and had been supplied with shell, his garrison could have resisted for an indefinite period all the forces that South Carolina could bring

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to bear. The idea that the world was coming to an end because bloodhounds bayed was ridiculous. God does not interfere with battles at all. When the ship *Constitution* was built of the toughest oak that ever grew on the sterile granite hills of New England, and was mounted with the largest guns that had ever before been used for the same amount of tunnage, and so arranged that five of these guns could concentrate at a certain distance and all hit a target the size of a hat, it was no wonder that she whipped the *Guerriere*. Timber and gunnery won that battle.

The PRESIDENT adverted to the fact that chemists were now directtng their attention to the purification of metals by new combinations. As regards iron, the Franklinite of this country was acknowledged to be the best in the world.

Captain BARTLETT considered that there had been a great mistake made by our government a few years ago in ordering six ships, built at a cost of about $1,200,000 each. Twenty-four small ships, with a few guns each, would now be able to line and blockade the whole southern coast. A vessel with the highest speed and the longest range of guns would whip anything.

Mr. BUTLER inquired if the covering or packing of General James' projectile was any larger in proportion than the patch of a rifle ball.

Captain BARTLETT—Hardly as large.

Mr. BUTLER conceived, in that case, that it would cause no material deviation of the shot.

The PRESIDENT remarked, in relation to packing, that, on the New York Central Railroad, some of the boxes on which the wheels ran had been constructed, and used for the last eight months, of rings of metal filled in with a substance like *papier maché*. The result was that there was a saving in the wear of from six to seven-eighths over the solid metal boxes. That might be suggestive of the saving of the wear of the cannon by a soft packing.

HEATING BUILDINGS BY STEAM.

Mr. DIBBIN remarked that insurance companies had expressed considerable anxiety of late in reference to the comparative safety of different modes of heating, and they have an impression that there is danger from accidental if not spontaneous combustion in buildings heated by steam pipes in contact with wood. Mr. D. expressed the opinion that, in consequence of a partial decomposition of the wood near steam pipes, spontaneous combustion might be possible—as, for instance, in the pine knots—the heat from the steam pipe falling short of the degrees of ignition.

Mr. BAKER stated that he had been engaged for six years past in putting in steam pipes, and he ran them through woodwork and among shavings without any fear of combustion. He had never yet known a case even of charring. It would require a pressure of from 70 lbs. to 100 lbs. to produce combustion. Six years ago he called the attention of insurance companies to his mode of using steam without pressure, and they were so well convinced of its safety that they made a reduction of 10 per cent in the rate of insurance.

Mr. FISHER had seen a few cases of charring and turning to ashes from steam, but it was probably caused by superheated steam. Low pressure, with superheated steam, he considered as liable to set fire as high pressure. He had heard of buildings being set on fire by Perkins' hot water apparatus. He considered it desirable that the pipes should always pass through something that could not be set on fire, or there was danger from superheated steam.

Mr. BAKER said it had been stated in the SCIENTIFIC AMERICAN that steam pipes were dangerous, and an open fire was the safest. In the year 1858 or 1859 there were about 200 deaths in the city of New York by setting fire to clothes.

Mr. BROWN said that he had laid wood against a pipe for 12 hours, heated to 700°, without being able to set anything on fire, though the wood was charred. He had also applied gunpowder with the same effect. He used precisely the same pipes that Perkins used for his steam generators. We had yet to learn whether carbon is more susceptible of ignition than the wood before it is charred.

Mr. JOHNSON—Charcoal made at a low temperature will ignite at a lower temperature than when made at a high temperature. Perkins' steam generator heated steam to 600°.

Mr. BAKER—A pressure of 70 lbs. will create a temperature of 300° I do not believe there has been a single instance of high or low temperature where the steam pipes have caused ignition.

Mr. JOHNSON—It should not go out that we have nothing in our buildings which will ignite from steam pipes, when the temperature is very high, as from supurheated steam.

NEW SUBJECTS.

The subjects for consideration at the next meeting will be :—

"Naval Architecture—Models for Speed, Capacity and Endurance—Best Applicable to the Operations of War and Commerce," proposed by Capt. Bartlett.

The subject for the meeting after next will be :—

"The Effect of Climate on Invention, and the Reaction of Invention on non-Inventive Climates," proposed by Professor Mason.

The Association then adjourned till Thursday, April 25th, at 7½ o'clock, p. m.

THE EVENTS OF THE WAR.

On the 15th of April, 1861, Abraham Lincoln, President of the United States issued a proclamation calling out the militia of the several States, to the aggregate number of 75,000, for the purpose of suppressing illegal combinations in the States of South Carolina, Georgia, Alabama, Florida, Mississippi, Louisiana and Texas.

This proclamation, in combination with the attack of the rebels on Fort Sumter, immediately united all parties at the North in support of the government, while it threw the Border States, Maryland, Virginia, Kentucky, and Missouri into greater trouble than ever. The Governors of the three last named States refused to comply with the President's requisition for troops. The Northern States responded with remarkable alacrity and unanimity. Delaware also, which, though it contains only about 1,000 slaves, is always counted as one of the 15 slave States, took a decided stand in support of the government. The first troops that arrived in Washington in response to the President's proclamation were 500 from Pennsylvania, on the 17th, though the first full regiment that arrived was one from Massachusetts on the 19th, and these are being followed by the required quota from the other States, quite as fast as they can be organized, arranged and quartered.

On the 17th, in a secret convention in Virginia, which has a population of 1,500,000, much larger than that of any other Southern State, passed an ordinance of secession. At the same time, 2,500 men were sent to seize the arsenal at Harper's Ferry, containing some 15,000 stand of arms, under the protection of a single company of United States soldiers. On the approach of the secessionists, the commander of the arsenal, in obedience to orders from Washington, burned the arsenal and retired. This attempt was probably part of a plan to seize the capital, as this had been boldly threatened by the leaders of the rebels. On the 20th, the bridges on the railroads leading from Baltimore to Washington were broken down and burned, and the telegraph wires cut, doubtless to prevent the arrival of reinforcements at Washington. Communication with the North is, however, open by the way of Annapolis on Chesapeake Bay, which is connected with Washington by a railroad 39 miles in length. Troops are now being rapidly sent by this route; 4,085 left this city on Sunday, the 21st, in three steamers, with sealed orders, but it is supposed for Annapolis. It is said, also, that some 2,000 more left during the night.

The first blood was shed in Baltimore on the 19th of April, the anniversary of the battle of Lexington, the first battle of the Revolution. A regiment of Massachusetts soldiers, marching through the city on their way to Washington, was surrounded by a mob of the roughest part of the population, a portion of whom jeered the soldiers and occasionally threw bricks and stones at them. Finally a villain suddenly seized the musket of one of the soldiers, wrested it from his hold, and deliberately shot the soldier in the back. The comrades of the murdered man turned and fired upon the mob. A few of the mob were killed—the numbers are variously stated—and two of the soldiers. The regiment forced its way through and reached Washington in safety.

Great union meetings, without distinction of party, are being held all over the North for the support of the government and the laws. On Saturday, the 20th ult., a meeting was held in Union-square, this city, probably the largest ever collected on the western continent. It was addressed by the leading men of the several parties and the most prominent clergymen of the city, all suppressing party questions and vieing with each other in the support of the Union.

Illinois Central Railroad.

The following is a comparative statement of the business of this road for the first three months in each of the following years:—

	1859.	1860.	1861.
Land sales	$141,013 47	$98,919 57	$479,900 58
Cash collected	126,185 40	122,439 46	184,826 82
Traffic	417,380 64	581,176 80	831,688 30
Total	$684,579 51	$802,535 83	$1,496,415 70

The sale of lands by the company has already assumed larger figures than in the winter months of any previous year. Since the first of October, the sales exceed $1,000,000, and were made chiefly to small farmers, averaging between 60 and 70 acres to each purchaser. The letters of inquiry are from all sections of the country, and the emigration to Illinois promises to be immense this spring.

WROUGHT-IRON CANNON.—The Phœnix Iron Company intend making a number of Mr. Griffin's patented wrought-iron cannon for the government. We have spoken previously of the durability and the superiority these cannon have over all others. The same works have for some time been engaged in making iron girders or beams for new buildings, fifteen inches high and of any length required. In this, this company have been able to exceed the British works, they not being able to make girders more than nine inches high. The Phœnix Iron Company have orders to make iron girders twenty-four inches high, and are now making a new set of rollers to execute the order. They are also making railroad iron for different railroad companies, and merchant iron of every description.—*Phœnix.*

WOODEN BARRACKS IN FORTS. — From an early acquaintance with some of the officers of the engineer corps of our army, we have always looked upon them as a very superior body of men, thoroughly conversant with everything relating to the science and art of their profession. But we find it difficult to reconcile this opinion with the result at Fort Sumter. Why was this great fortification, which cost millions of dollars, so constructed that a single shell or red hot shot would render it untenable? Why are these combustible barracks erected in the midst of our solid stone fortresses?

GREAT AGE OF A HORSE.—Wilkes' *Spirit of the Times* gives an account of a small black Galloway, eleven hands high, which attained to the greatest age of any horse of which we have any record. He was a resident of a small village near Haddington, in Scotland. He was foaled in 1720, and at the time of his death he was 69 years old. A few weeks before his death he trotted for several hours at the rate of seven or eight miles an hour, and fed well on his oats and hay to the last.

OUR EAGLE.—If any of our friends who are passing down Park-row or Broadway will cast a glance at the southwest corner window of the SCIENTIFIC AMERICAN office, they will see a remarkably spirited specimen of carving representing the American Eagle. In these days, when disappointed politicians are trying to pluck the plumage from the rider of the whirlwind, it is with peculiar satisfaction that we see reflected upon our desk the broad shadow of his golden wings.

MONEY FOR THE GOVERNMENT.—There have been spontaneously offered to the General Government by the citizens of New York the enormous sum of $290,000,000. We are requested by a member of the Chamber of Commerce to state that it is desirable that persons making these offers to government, should make them directly in their own name.

SIGN your names to your letters, or they will not receive attention. We do not like to be interrogated by any of our readers who withhold their names. It is a general rule in all publishing offices to take no notice of such communications. We claim a right to know with whom we are dealing, and it is a nuisance to be bothered with anonymous correspondents.

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ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING APRIL 16, 1861.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 4, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

1,033.—J. D. Alvord, of Bridgeport, Conn., for an Improvement in Binder Guides for Sewing Machines:

I claim the combination of the guide lips of a binder-guide with a common stock that is separate from the stock of the binding-turner, so that the lips need not be separately adjusted when the instrument is to be set to apply binding of a different width to an article to be bound, substantially as set forth.

I also claim the combination of the stock of the guide-lips of a binder guide with a presser foot which is independent of that of the sewing machine to which the binder guide is to be applied, substantially as set forth.

1,034.—James Armstrong, of Dobbinsville, N. C., for an Improvement in Operating Pumps:

I claim the combination of a pendulum, A, and chair, F, spiral spring, B, and stop rod, G, with a lever or levers, J J A′, and two or more pumps, arranged and operating substantially as and for the purposes set forth.

1,035.—J. R. Armstrong, of Kendallville, Ind., for an Improvement in Steam Engines:

I claim the arrangement of the piston rods, d d, and piston, D, with the slotted crosshead, C, wrist plate, H, wrists, e h, valve rod, i, and oblong steam cylinder, A, all as shown and described for the purposes set forth.

1,036.—F. M. Bacon, of Ripon, and Joseph Fowler, of Hartland, Wis., for an Improvement in Seeding Machines:

I claim the arrangement of the graduated adjustable plates, K, with the tangentially moving seed cups, J, and wheels, I, substantially as shown and described, whereby by moving the said plates, K, all the cups will be simultaneously adjusted and regulated as set forth.

Also, The arrangement with the seed wheels, I I, and troughs, D D, of the self-adjusting step, like suspended seed scattering board, L, inclined board, N, and blocks, M, the whole constructed and shown and described for the purposes set forth.

Also, The arrangement of the adjusting plates, U, bars, P W, teeth, g, and shaft, Q, with the lever, X, swinging bars, R, shaft, T, and frame, A, all in the manner and for the purposes shown and described.

[This invention relates to an improved seeding machine of that class which are designed for sowing seed broadcast, and consists in an improvement in the seed-distributing device, whereby the seed may be sown in greater or less quantities over a given area as may be desired, and evenly distributed over the surface of the ground.]

1,037.—James Bain and S. C. Brown, of Richmond, Ind., for an Improved Tenoning Machine:

I claim the employment or use of one or two rotary cutter heads, C, provided with bent or angular cutters, D D, as shown, in connection with the bed or table, E, provided with the gage, F, and guides G G, all being arranged to operate as and for the purpose set forth.

[The object of this invention is to obtain a machine of very simple construction by which panels may be expeditiously formed on doors, and rabbets cut in doors, window blinds and other articles. The invention consists in the employment or use of one or more rotating cutter heads, peculiarly constructed and used in connection with an adjustable gage and guides and an adjustable table.]

1,038.—G. N. Bronson, of New Milford, Conn., for an Improvement in Felting Machines:

I claim the adjustable stock, G, in connection with the reciprocating bars, C D, when arranged for joint operation, as and for the purpose set forth.

[This invention consists in the employment or use of an adjustable stock or bed in connection with reciprocating beaters, whereby the desired work of felting may be very expeditiously and perfectly done.]

1,039.—J. C. Butterworth, of Providence, R. I., for an Improved Sash Fastener:

I claim the combination of the cam, recessed and furnished with the friction pad, substantially as described, with the plate, and spring, for the purposes set forth.

1,040.—Saml. Caldwell and R. W. Caldwell, of Chillicothe, Ohio, for an Improvement in Cider Mills:

I claim the combination of the adjustable spiked concave block, K, with a single adjustable spirally spiked and grooved cylinder, G′, in the manner and for the purpose shown and described.

Second, The combination of the adjustable spirally grooved and spiked cylindets, G G′, with each other and with the adjustable spiked concave block, K, in the manner and for the purpose shown and described.

[This improvement in cider mills relate to a novel means of more effectually crushing the apples, and also to a means for partially crushing the apples before they are submitted to the final crushing operation and for regulating the feed of the apples to the crushing cylinders.]

1,041.—Adam Carr, of Paterson, N. J., for an Improved Low Water Alarm for Steam Boilers:

I claim, first, The nipple, A A, provided with the aperture, D, into which the gage pipe, C′, expansion pipe, C, and supply pipe, E E, are inserted and connected with boiler, b, arranged and operated as set forth.

Second, I claim the cross, F, constructed as described, in combination with the expansion pipe, C, and the supply pipe E, for the purpose set forth.

1,042,—John Caswell, of Syracuse, N. Y., for an Improvement in Brick Machines:

I claim combining with the extension plate pistons, movable molds continuously operating as described for expelling the air from the clay during the operation of pressing the same, and preventing it from concentrating in the central portion of the clay lying immediately between the extension plates of the stationary and movable pistons, as set forth.

1,043.—John Caswell, of Syracuse, N. Y., for an Improvement in Brick Machines:

I claim, first, Making the frame of the machine in one rectangular piece, consisting of the sides and ends A, and the crosstie, B, within it, to which the stationary pistons, C, are secured, and provided with the bearings at its sides, upon which the movable piston frame, E, and molds bear their entire length during the whole extent of their reciprocating movements, substantially as described.

Second, I claim expelling the air from the clay during the operation of pressing the same, and after the mold is closed, by means of the movable molds, K K3, constructed, arranged and operating as set forth.

Third, I claim the combination and arrangement of the right angled slotted levers, T, connected together at top, sliding lifting platens, S′, having pins or studs, S2, at their lower ends, which enter the slots of the said levers, T, at the proper intervals of time, and horizontal sliding cross bar, V, having anti-friction rollers on its ends, which enter the grooves, W, in the cog wheels on the main shaft, for lifting or discharging the bricks from the molds and pressing them between the upright springs, Y, and standard, X, substantially as described.

Fourth, I claim suspending the frames in which the sliding platens, S′, are secured, in horizontal guides, Q, below the molds, for enabling their movements to be arrested by the ends of the stop bar, a, coming in contact with them, during the upward and downward movements of the lifting platens, as before described.

Fifth, I claim the employment of the upright springs, Y, and standards, X, on the sides of the sliding platen frame, for holding the bricks suspended on a plane sufficiently far above the pistons to clear them, and the cam bars, Z, for releasing the hold of the springs, and causing the bricks to drop on the upper surface of the pistons, as set forth.

1,044.—C. A. Clark, of Pulaski, Iowa, for an Improvement in Valves for Pumps:

I claim the loose perforated valves, F F′, operating in connection with the apertures, b b′, and rods, G G′, as and for the purpose set forth.

[This invention consists in a novel combination and arrangement of spring wire loops connected together in chains by wire links, said chains being connected to a right angular frame by spring eyes and wedge pins, the whole forming a very good bed bottom,]

1,045.—Samuel Clegg, of Putney, Surrey county, England, for an Improvement in Gas Meters. Patented in England April 22, 1858:

I claim, first, The method of constructing the drum with measuring chambers at the periphery, arranged substantially as described.

Second, The arranging the drum of a gas meter, substantially as described, so that it may rise and fall with the water in the meter by floating thereon.

Third, The use of a cup or vessel, h, arranged substantially as described, that is to say, supplied with gas of the same pressure as that in the drum, and so connected therewith as to balance it and keep the water line within the drum constant whatevermay be the variations in the pressure of the measured gas.

1,046.—H. A. Clum, of Auburn, N. Y., for an Improved Barometer:

I claim, first, The use of the auxiliary chambers, C (one or more), in the construction of barometers, as set forth and described in Figs. 1 and 2, in drawing and specification.

Second, The buoy and shaft, D and N, Fig. 2, and the manner in which they are employed, as set forth in drawing and specification.

Third, The connection of the auxiliary chambers to the shaft, N, and buoy, D, shown at S S and J J, Fig. 2.

Fourth, The compensating lever and plunger for equalizing the action of the mercury upon the upright arms in the cistern, as shown at U V W, Fig. 2.

Fifth, The manner of communicating the motion of the floating apparatus to the hand, H, as shown at R, Fig. 2, and F, Fig. 1.

Sixth, The reading of pounds and fractions of pounds, in combination with the usual inches and fractions upon a circular dial.

Seventh, The tube, B, composed of two or more sections and their combination, as shown at O, Fig. 2, and explained in specification.

Eighth, The combination of the auxiliary chambers, C C, with the shaft, N, and buoy, D, the rack work, R, and their connections, as shown at P P M J J and S S, Fig. 2, and their united use with the mercurial column.

1,047.—Loughlin Conroy, of New York City, for an Improvement in Street-sweeping Machines:

I claim, first, The endless sweeping apron, Q, when formed of brushes, R, rakes, S, scrapers, T, any one of said parts being used, or all of them combined and connected together by links, j, or an equivalent universal joint attachment, for the purpose of rendering the apron flexible, so that it may conform to the inequalities of the surface of the street, as set forth.

Second, In combination with the sweeping apron, Q, the pressure rollers, U, applied and arranged to operate as and for the purpose set forth.

Third, The arrangement, substantially as shown, of the sector plates, M M, inclined plane, I, and slides, G G, on which the cylinder, E, is placed, whereby the apron may be raised and lowered as set forth.

1,048.—G. W. Cooper, of Pylmyra, N. Y., for an Improvement in Plows:

I claim the arrangement of the curved adjustable bar, E, and the swinging standard, D D, with the curved bars, B B, and beam, A, all as shown and described, for the purpose set forth.

[The object of this invention is to obtain a plan that may be constructed extremely light, be exceedingly strong and durable and capable of having its share readily adjusted to plow more or less deep as desired.]

1,049.—J. S. Davison, of Cranberry, N. J., for an Improvement in Faucets:

I claim the arrangement of valves, h and I, as shown in Fig. 5, together with the chambers, D and L, and valve rod and springs, as set forth and described.

1,050.—William Deckman, of Canton, Ohio, for an Improvement in Hay Rakes:

I claim the employment of driving wheel, D, and its accompanying mechanism, in combination with levers, K and i, on rod, h, all arranged as and for the purpose specified.

1,051,—Lewis Eikenberry, of Philadelphia, Pa., for an Improved Valve Arrangement:

I claim, first, Effecting a connection between the sliding diagonally set tubular shifter, E, crankshaft, A, and the eccentric, C, by means of an oblong slot, a cut through the tubular shifter, one or more guide pins, b b, projecting from the shaft through the slot, substantially as and for the purpose set forth.

Second, The combination of a governor, D, or a governor and spring, with a diagonally set tubular shifter, E, constructed and operating as described, and a shaft, A, substantially as and for the purposes set forth.

1,052.—J. M. Foy, of Fountain Green, Ill., for an Improvement in Corn Planters:

I claim, first, The combination and arrangement of the sickle-shaped bar, P, lever, V, ratchet teeth, f, and dropping wheel, Q, as and for the purposes set forth.

Second, The arrangement of the dropping wheel, Q, ratchet disk, R, spiral spring, d, shaft, B, and forked lever, W, in combination with the pallet lever, M, in the manner and for the purposes set forth.

1,053.—Reymond French, of Seymour, Conn., for an Improvement in Joints for Railroad Rails:

I claim strengthening the joints of railroad rails by heating and shrinking the chair on to the joints, substantially as described.

1,054.—Samuel Fulton, of Conshohocken, Pa., for an Improvement in Molds for Casting Pipe:

I claim the pattern, B, cylinder, D, and rammers, E, placed within a suitable flask, A, and arranged with a screw shaft, H, to operate substantially as and for the purpose set forth.

[The object of this invention is to facilitate the ramming of the sand in forming molds for casting pipes, thereby greatly expediting the work and chiefly dispensing with the tedious and imperfect manual operation.]

1,055.—George Goulding, of Watertown, N. Y., for an Improvement in Spinning Machinery:

I claim the construction and arrangement of the shaft, S2, stand, S3, and pinion, X2, in combination with the gears that operate the rollers, R R, as described.

1,056.—Samuel Fulton, of Conshohocken, Pa., for an Improvement in Core Carriages:

I claim a core carriage provided with a revolving shaft, C, and wheels, D D, arranged with hooks, E, or their equivalents, to serve as bearings for the cores, all being arranged substantially as shown, to admit of the changing or shifting of the cores within the oven, as and for the purpose set forth.

[The object of this invention is to economize in the casting or manufacturing of the smaller kinds of metal pipes, which is done by drying a large number of molds in one pit and casting a large number of pipes under one and the same crane.]

1,057.—L. X. Gargan, of Paris, France, for an Improved Feed Water Apparatus for Steam Boilers:

I claim the apparatus for feeding boilers, constructed and arranged substantially as shown and described, the same consisting of a hollow cylindrical or prismatical valve sliding within a correspondingly cylindrical or prismatical body provided with three independent channels that communicate respectively with a water and steam space in the boiler and the supply tank, as described, and are disposed in relation to the three ports in the valve, so as to come, when in operation, in simultaneous juxta position with the steam and water channels while closing that of the supply channel, and vice versa, as set forth.

I also claim the combination and arrangement of the feeding apparatus, as shown and described, the same consisting of a hollow plug with side openings, capable of rotation upon its axis, within a body provided with four channels, as described, so that the said openings shall come opposite to the steam and water channel, and the water supply and air or steam escape channels successively, as set forth.

1,058.—George Gatty, of New York City, for an Improved Curtain Fixture:

I claim the toothed roller pulley, A, with cord, G, placed on it, in combination with the adjustable band, F, provided with teeth, e, rollers, g g′, and acted upon by a spring, f, all arranged for joint operation, substantially as and for the purpose set forth.

[This invention consists in having the roller pulley at one end of the shade, roller cogged or toothed as well as grooved, and using in connection with said cogged roller pulley, a band which encompasses it and is pivoted at one end, the band being toothed and arranged to gear into the roller pulley, and having guide cord rollers fitted in it in such relation with the cogged roller pulley that, by actuating the cord that passes around the roller pulley, the leather band which retains the shade roller or prevents it from casually turning will be thrown out of gear with the roller pulley and the shade raised or lowered as desired.]

1,059.—Joel Haag and J. C. Smith, of Bernville, Pa., for an Improvement in Water Wheels:

We claim the combination of the inclined chutes or water guides, a, cylinder or rim, b, concave spiral buckets, d, dome-shaped cap, E, flume, A, annular draft way, f e, the whole being constructed and arranged in the manner and for the purposes set forth.

[This invention relates to an improvement in horizontal water wheels, and consists in the employment or use of stationary cleats or water guides, arranged relatively with a discharge or draught tube and a flume, whereby it is believed several advantages are obtained over other wheels of a similar kind hitherto devised, to wit, the easy and uninterrupted flow of the water through the wheel, the preventing of the wheel being retarded by back water, and the general adaptability of the wheel in all cases where a horizontal wheel is desirable.]

1,060.—W. C. Hicks, of Boston, Mass., for an Improvement in Sewing Machines:

I claim, first, The method, substantially as described, of controlling the needle thread in sewing machines, by causing the controller during the whole of its ascent to act as a "take up" to said thread, then leaving it suspended on a stationary independent rest, and afterward, and as the needle eye enters, or is about entering the cloth, casting off the needle thread so as to make it hang freely or loose during the concluding portion of the down stroke of the needle. This I claim in contradistinction to the drawing up of the needle thread only at the concluding part of the upward stroke of the needle as in the method previously patented to me, as referred to.

Second, The employment of an intermediary tension on the needle thread as the needle bar commences its descent, by a temporary relaxation in the tension, at said period, essentially as and for the purpose or purposes mentioned.

Third, The combination of a reciprocating take up and cast off to the needle thread, having a constant motion in unison with that of the needle bar, and stationary independent rest or support for the needle thread to retain it free from motion or action by the controller during the early portion of the downward stroke of the needle, essentially as specified.

Fourth, Constructing the stationary independent rest and lifting saddle of the controller so that the needle thread, in being drawn up, will be urged away from or to one side of its perpendicular travel in line with the needle, and so that on the moving portion of the controller completing its upward stroke, or thereabouts, the needle thread will spring and slide itself from off the lifting saddle on to the stationary rest, substantially as described.

Fifth, Constructing the lifting saddle of the controller of greater width than the independent rest on which the thread is left suspended at the end of the upward stroke of the needle bar, for the purposes specified.

Sixth, Providing the moving portion of the controller with an inclined plane at its one side, to act as a cast off to the needle thread from off its independent rest, essentially as set forth.

1,061.—David Humphreys, of Cincinnati, Ohio, for an Improvement in Corn Planters:

I claim the arrangement of cut-off, H h h′ h″ I, measuring slide, G g g′, and ventage, d, operated from a ground wheel, B, in the manner and for the purposes set forth.

1,062.—Rensalier Jadwin, of Grafton, Ohio, for an Improved Apparatus for Supplying Steam Boilers with Water:

I claim the chambers, A B, the pipes, M N and L P, the passages, a b and a′ b′, with the pair of valves, C D, in each chamber, the several parts being constructed, arranged and operated in the manner and for the purpose set forth.

1,063.—C. Johnston, of Clarksville, Mo., for an Improvement in Shot Pouches:

I claim, first, The combination of a single shot-receiving tube, O, with a double pouch, G H G′, and two valves, A A′, substantially as and for the purposes set forth.

Second, The combination of a shot-receiving tube, O, sliding within a stationary tube, N, and inclined planes, I J, arranged in relation to each other substantially as and for the purposes set forth.

Third, The combination of the plug, L, having a screw thread on one portion of its shank, and made square the remainder of its length, with the tubular knob, 4, and tubes, N O, substantially as and for the purpose set forth.

1,064.—Thomas King, of West Farms, N. Y., for an Improvement in Power Looms:

I claim, first, Combining the shuttle driver, O, with the treadles, Q, by means of springs, g g′, a strap, f, a rocker, P, and cords, e l or their equivalents, the whole applied in connection with each other and in combination with a locking bar, U, and unlocking piece, m, to operate as and for the purpose specified.

Second, The lever, X, with its roll or shaft, X′, and weight, X2, applied substantially as described, in connection with the weight, V2, on the friction band, V′, of the yarn beam and operating as set forth.

1,065.—Anthony Lamb, of Cambridge, Mass., for an Improved Bookcase:

I claim the described revolving bookcase, when the several parts are arranged and constructed in the manner and for the purpose set forth.

1,066.—T. J. Lowry, of Conneautsville, Pa., for an Improvement in Transmitting Power:

I claim the arrangement of the sliding platform, A, track, E, and wheels, D B, with the circular suspended track, C, all in the manner and for the purposes shown and described.

1,067.—George Lull, of Hardin, Iowa, for an Improvement in Grain Separators:

I claim the screen or screens, constructed with a ribbed and channeled surface, and having elongated perforations through the bottom of the channels, substantially as and for the purposes described and shown.

[This invention has for its object the more perfect separation of oats from wheat by the employment of one or more screens consisting of corrugated metal plates, having oblong or elliptical perforations between the corrugations, the largest diameter of said perforations being in lines at right angles to the corrugations, thereby allowing grains of wheat, &c., to pass freely through the screens, and causing the oats to pass over the screen or screens in lines parallel with the corrugations or elevated surfaces of the screens.]

1,068.—Curtiss Luther, of Newbury, Ohio, for an Improved Wheelwrights' Machine:

I claim the special arrangement and combination of the several parts in the manner set forth, so that the various kinds of work in making carriage wheels, as boring the hub, tenoning the outer ends of the spokes after they are set, and boring the felloes, may all be performed upon the same machine, placed upon a common workbench, and operated by hand as specified.

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1,069.—H. F. Mann, of Laporte, Ind., for an Improvement in Plows:

I claim arranging the handles on the beam and moldboard of the plow, substantially in the manner described, so that they act as stays or braces to the standard, beam and moldboard, and, at the same time, offer no obstruction to the dirt, weeds, &c., in rear of the standard and above the landside bar, as set forth.

1,070.—B. A. Mason, of Newport, R. I., for an Improvement in Splicing Rails for Railroads:

I claim splicing the sections of rails for railroads by slotting the ends thereof, substantially as described, in combination with the vertical splicing piece with its elongated head fitted within the elongated portion of the slots and resting on the shoulders thereof, and with its shank passing down through the residue of the slots and through the crossties, and secured below by a key or its equivalent, substantially as specified.

1,071.—Alexander Millar, of New York City, for an Improvement in Cork Machines:

I claim, first, The combination of the rod, d, hollow cutter stock, c, hollow spindle, b, adjustable collar, g, pivoted arm, H, and spring, I, the said parts being constructed and arranged in the manner and for the purposes shown and explained,

Second, I also claim the adjustable knife springs, J J, with the rack teeth, j, on the knife bars, i i, when said springs are constructed and applied to the cutter stock, as described, for the purpose set forth.

Third, The combination of the treadle, P, spring, S, connecting rod, N′, lever, N, jointed arms, s s, bar, K, adjustable collars, n n′, and fixed bearings, K′, all constructed, arranged and operating substantially as and for the purposes specified.

1,072.—James Millholland, of Reading, Pa., for an Improvement in Furnaces for Steam Boilers:

I claim the zigzag order of placing the tubes for the purpose of receiving, by lateral contact with the fuel, a more perfect transmission of the heat to the water within them, substantially as described.

Second, The zigzag order of the tubes, in combination with their inclined position, for the joint purpose of procuring a more perfect transmission of the heat to the water within the tubes, and the circulation of the water through the tubes, substantially as described.

1,073.—William Morrison, of Chadd's Ford, Pa., for an Improvement in Cultivator Teeth:

I claim a cultivator tooth having a sharp front edge, flaring sides and a diamond or arrow-shaped opening at its top, to receive a similarly shaped shank by which it is united to the cultivator frame, substantially as described.

1,074.—G. W. Nevill, of Bath, Ill., for an Improvement in Seed Drills:

I claim the wheels, C, and the wheels, E, being fixed upon shafts hopper, B, conveyers, D, and shoes, F, the whole arranged and operating as set forth.

1,075.—Adam Newkumet, of Philadelphia, Pa., for an Improvement in Drain Tiles:

I claim a tubular or cylindrical drain tile formed of two longitudinal and separate parts, A B, provided with ribs, a, and fitted together as shown, for the purposes set forth.

[This invention relates to an improvement in the tubular or cylindrical drain tile which are molded out of clay and baked. The object of the invention is to facilitate the molding of the class or form of drain tile aforesaid, and also to obviate the warping of the same during the process of baking, as well as to facilitate the baking operation.]

1,076.—Adam Pritz, of Dayton, Ohio, for an Improvement in Harvesters:

I claim, first, The employment of a detachable crank-shaped key, N, in combination with two adjustable curved toothed bearings, G G, two curved slotted guide boxes, E E, two revolving pinions, H H, one or more ratchet wheels, I, one or more stop pawls, J, the harvester frame, A, and the master or driving wheel, B, substantially as and for the purposes set forth.

Second, Providing the detachable crank-shaped key, N, with the ratchet wheel, O, to operate in combination with the pawl, M, on one of the slotted guide boxes, E, of the master wheel, B, and on the guide box, F, of the grain wheel, D, substantially as and for the purpose set forth.

1,077.—William Resor, of Cincinnati, Ohio, for an Improvement in Cooking Stoves:

I claim, in combination with the firebox, A, and vertical flues, a and b, arranged with reference to the oven, C, as described, whereby the heated currents are divided over the oven and conducted separately around the same in the manner set forth, extending a close hearth plate from the front end of the firebox into the same to a point near the center thereof, whereby the air for combustion is supplied at or near the center of the firebox, and the heat is caused to be distributed more equally above and around the front and rear end of the oven, substantially as set forth.

1,078.—G. W. Rice, of Demopolis, Ala., for an Improvement in Cotton Cultivators:

I claim the arrangement in the peculiarly-framed scrapers, E E, and U-shaped bars, D D, with each other and with the standard, C, brace rods, F F, adjusting rod, G, and beam, A, all as shown and described, for the purposes set forth.

[This invention relates to a new and improved scraper plow for scraping the growing cotton plants at both sides of the row simultaneously. The invention consists in attaching two shares to a beam in a novel way, whereby the shares may be very readily adjusted nearer together or farther apart, as may be desired, and a very simple, efficient and economical scraper plow obtained.]

1,079.—E. J. Richmond and Thomas Wright, of New York City, for an Improved Stable Broom:

I claim, as an improved article of manufacture, a splint broom made in the peculiar manner shown and described, with doubled or looped inner splints, B′, and inner binding wire, C, as set forth.

1,080.—Powers Ritchey, of Hamilton, Ill., for an Improvement in Corn Planters:

I claim the arrangement of the curved runners, A A, adjustable pivoted openers, D D, and presses, K K, with each other, and with the seed boxes, C C, slides, h, and levers, H H, all as shown and described, for the purposes set forth.

[This invention consists in combining with sled runners adjustable shares or furrowers, which can be so adjusted that the corn may be deposited in drills or furrows at any desirable depth, and the earth covered over it and leveled by the broad flat sled runners.]

1,081.—Cyrus Roberts, of Belleville, Ill., for an Improvement in Machines for Threshing and Separating Grain:

I claim, first, The combination of the grated feed board, a, and inclined conveying board, c, of the thrasher, with the vibrating conveyor substantially as specified.

Second, Constructing the concave with diverging, distributing grooves, substantially as described.

Third, The combination with grooves in the concave of supplemental distributing grooves in front of the concave, substantially as described.

Fourth, Constructing the separator in sections having opposite simultaneous vibrating motion in combination with shaking fingers overlapping the opening between the sections, substantially as described.

Fifth, The method of separating the grain from the straw by drawing out and attenuating and, at the same time, shaking by means of lifting fingers the mass of mixed straw, grain and chaff, over the openings between the sections of the separator, substantially as described.

Sixth, The diaphragm, d′, the fingers, j, above, the space, d″, and bottom, d, below, in combination, substantially as described.

Seventh, The combination with a vibrating conveyer and separator of fine vibrating fingers over the throat of the conveyer, and coarse vibrating and shaking fingers above the finer ones; the coarse fingers shaking up the straw and making a coarse separation, and the finer fingers making it finer and more complete, thereby facilitating the winnowing.

Seventh, The combination of the head trap, z′, with a wheat screen, z, acting together substantially as described.

1,082.—Thomas Service, of Utica, Pa., for an Improvement in Wagon Locks:

I claim the stop bar, W, in combination with the sliding reach, D, both constructed as described and operating together for the purposes set forth.

1,083.—Edwin Smith, of Naugatuck, Conn., for an Improvement in Suspender Buttons:

I claim a button formed by the combination of the sheet metal shell, A B, with the solid center piece, a, when the parts are so connected that the shell may be freely revolved on, or around the center piece when attached to the cloth, the whole being constructed and fitted to operate substantially as described.

1,084.—S. J. Smith, of New York City, for an Improvement in Eyelet Machines:

I claim the arrangement of the cylindrical stem, d or g, springs, l or 5, and cap, e or h, in the perforated arm, c, as specified.

I also claim the percussion ball, i, in combination therewith, as set forth.

1,085.—M. D. Snyder and S. A. Snyder, of Clarendon, N. Y., for an Improved Carpet Fastener:

We claim a carpet fastener of the lozenge shape described, having two equal parallel sides and two unequal extremities, diminishing from a common point of enlargement, substantially as shown and described.

We also claim the set, A, provided with the distance gage, d, and inclined gage or gages, d, to be used in combination with said fastener, substantially as and for the purposes shown and described.

1,086.—Ezariah Spaulding, of Morrisville, Vt., for an Improved Clothes Wringer:

I claim, first, The combination of the treadle, c, with the arms, m m, and slides, d d, arranged and operating as described and for the purposes set forth.

Second, The combination of the metal pieces, f f, with the slots, e e, and spring, s, constructed and operating in the manner and for the purpose shown.

1,087.—Joseph Stone and J. T. Archibald, of Wapello, Iowa, for an Improvement in Corn Planters:

We claim the arrangement of the adjusting cutters, L, with the hinged seed boxes, O, oscillating seed tubes, N, and lever, J, substantially as and for the purposes shown and described.

The arrangement of the double crank axle with the frame, A, and spud, I, substantially as and for the purposes shown and described.

The arrangement of the adjusting bars, H H, with the adjustable standard bars, E E, and frame, A, in the manner and for the purpose shown and described.

[This invention relates to a novel and improved arrangement of parts whereby the driver or operator has complete control over the machine the furrow shares being allowed to be raised temporarily at the will of the driver or operator, and the whole framing of the machine also allowed to be raised bodily when required. Provision is also made to insure the proper distribution of the seed and the ready adjustment of the shares.]

1,088.—Isaac Stout, of Tremont, Ill., for an Improvement in Cultivators:

I claim attaching the front cultivator teeth to the guiding handles of the plow, when arranged substantially as described.

1,089.—Louis Tilliers, of Mott Haven, N. Y., for an Improved Vise:

I claim a vise in which one limb has the jaw, B, hinged with a vertical movement and the other with the jaw, C, with a horizontal movement: the whole arranged, constructed and operating as and for the purpose set forth.

1,090.—Franklin Traxler, of Salem, Mich., for an Improvement in Plows:

I claim the wedge, B, knuckle, K, fitting into the socket, L, flange, C D, projection, M, fitting into recess, N, the parts, 1 and 2 having corresponding faces and bolt holes; the whole being made, arranged and devised substantially in the manner and for the purposes set forth and described.

1,091.—W, P. Trowbridge, of Washington, D. C., for an Improved Specimen Cup for Deep Sea Sounding:

I claim a form and construction of a specimen cup having a single hole or opening in the bottom of the cup, which leads, by a short conical tube, to an enlarged cavity within, the tube rising above the bottom of the cavity, so that the specimen, on being forced through the tube when the lead strikes the bottom, will fall over the top of the tube into the cavity around it. The top of the tube being closed by a valve, which is not, however, deemed an indispensable part of the invention: all constructed and arranged as set forth.

1,092.—O. B. Wattles, of Mooresboro', N. C., for an Improvement in Straw Cutters:

I claim, first, The relative arrangement of a feed apron, X, and rollers, S Z, with fixed bearings and a pressure apron, V, with one (C′) of its two rollers on hinged bearings, A′, in combination with a reciprocating knife, D, substantially as and for the purposes set forth.

Second, The combination of the hook, U, constructed and arranged as described, with the intermittent lever, M, pawl, Q, and ratchet wheel, R, for the purpose described.

Third, The sharpening device consisting of a sharpening steel, F, springs, G G, and adjusting screw nuts, I I I I, in combination with an oblique reciprocating knife, D, substantially as and for the purposes set forth.

Fourth, The relative arrangement of the feed apron, X, hinge pressure apron, V, intermittent feed device, L U M Q R, with an oblique reciprocating knife, D, all substantially as and for the purposes set forth.

1,093.—John Wenisch, of Tompkinsville, N. Y., and R. B. Berky, of New York City, for an Improvement in Tablets:

We claim the manufacture of tablets of paper, pasteboard, wood, sheet metal, or other material, coated first with the described priming composition, and afterward with the specified finishing composition, or of slabs of such priming composition coated with such finishing composition.

[This composition, applied as a coating on paper, pasteboard, metal, wood, &c., makes a superior substitute for school slates and blackboards.]

1,094.—T. W. White, of Milledgeville, Ga., for an Improvement in Seed Planters:

I claim, first, The combination of the hopper with a serrated blade receiving a positive movement in two directions, for the purpose of agitating the seed and drawing it from the hopper, substantially in the manner described.

Second, Leaving the upper end of the blade within the hopper unconfined, for the purpose set forth.

Third, The combination of the serrated blade with a guide wheel, when arranged so as to give a reciprocating movement to the blade, as described.

1,095.—S. M. Wirtz and F. Swift, of Hudson, N. Y., for an Improvement in Grain Separators:

We claim, first, Hanging the screens, G, on pivots, j j, in shoe, C, operating as and for the purposes set forth.

Second, Arranging the inclined screen, L, within shoe, C, so that said screen will have an end play and strike against pieces, m m, as and for the purposes set forth.

[This invention relates to a novel arrangement of screens and inclined boards in a vibrating shoe, for the more perfect separation of grain from foreign substances.]

1,096.—Arcalous Wyckoff, of Elmira, N. Y., for an Improvement in Water Pipes:

I claim the water pipe composed of the thin interior wooden pipe, A, the metallic coils or bands, B, around it, and the calcareous cement, C, around the whole (either with or without the bituminous coat or ingredient), constructed and combined substantially as and for the purposes specified.

I also claim the interior wooden thimbles, D D, in combination with the pipe constructed substantially as and for the purpose described.

1,097.—Alexander Clow (assignor to himself and H. S. Campbell), of Waterford, Pa., for an Improvement in Bee Hives:

I claim, first, Constructing bee hives with a permanent wall or side, C, rising from the lower structure, A, and sustaining the top, D, in combination with the drop sides or panels, E E E, and interior slides, F F F, whereby the whole interior of the hive and its contents may be exposed or removed without removing the top, substantially in the manner and for the purpose shown and described.

Second, I also claim the described manner of constructing the comb racks, K, and connecting them with the hive, to admit of their ready removal and change, substantially as shown.

1,098.—James Dodge (assignor to himself and David Blake) of Waterford, N. Y., for an Improvement in Hardening Saw Plates:

I claim the artificial, elastic, and flexible bed piece C, for the purpose described.

1,099.—Albert Gummer (assignor to himself and Gustavus Zscheck), of Indianapolis, Ind., for an Improvement in Lath Machines:

I claim, first, The operation of a right angled rest, q, with the slot, o, and the pin, p, or their equivalents, as described.

Second, The jaw, 3 3, with the projecting pieces, 2 2 2 2, the two set screws, 6 6 6 6, and the circular spring, 5, substantially as and for the purpose set forth.

1,100.—L. L. Knight (assignor to E. Hastings and E. B. Hastings), of Barre, Mass., for an Improved Clothes' Frame:

I claim hinging or pivoting the stretching arms, C C C C, to hub, B, and combining therewith the two armed brackets and slides, G as and for the purposes shown and described.

[The nature of this invention consists in hinging or pivoting the radial stretching arms to the hub, and in combining with said hub and hinged or pivoted arms angular brackets and slides, one of the arms of said brackets being in a vertical position and the other arm at a suitable angle, thereby enabling the stretching arm to be readily secured in a closed or in an open state, and put up into a very compact shape when not in use.]

1,101.—Joseph Lofvendahl (assignor to himself, N. P. Lindergreen and E. Ehlin), of East Boston. Mass., for an Improvement in Button Fasteners:

I claim the employment of a disk or washer, B, perforated with holes C, corresponding in number and position to the points, a, attached to the collet of a button, A, in the manner and for the purpose shown and described.

[This invention consists in the employment of two or more points that are rigidly attached to the collet of a button, in combination with a perforated disk placed at the underside of the fabrics to which the button is to be attached in such a manner that when the button is fastened to the fabric by passing the points through it, and bending them down on the under side, said disk forms an additional hold, and prevents the button most effectually from becoming loose or detached.]

1,102.—G. W. Martin, of Morrisania, N. Y., (assignor to himself and Wm. Sheppard, of Tremont, N. Y., for an Improved Wrench:

I claim the rocking cam jaw, d, applied to the stock, b, in the manner and for the purposes specified.

1,103.—Wm. M. Van Wagener, (assignor to himself and D. F. Tompkins), of Newark, N. J., for an Improved Boat Detaching Apparatus:

I claim the application and use of the bolt, A, as a boat detacher, said boat being hinged or looped at one end, in combination with and operated by means of the lever, B, at the other end, substantially in the manner and for the purposes described.

1,104.—L. R. Wright (assignor to himself and T. R. Howard), of Cohoes, N. Y., for an Improvement in Seed Planters:

I claim, first, The combination of the lever, e, cam, f, and spring, g, with the piston, c, and cell, d, in the rotary cylinder, H, forming the bottom of the seed box, J, the whole constituting an adjustable seed dropping device that empties the seed cell with a positive motion, as described.

Second, The combination of the hinged frame, R, carrying the roller, Q, and the adjustable block, O, carrying the coverer, N, with the frame A, carrying the plow, K, and supported forward thereof, by a wheel or wheels, C, the plow and coverer being thrown into and out of action upon the soil by means of the jointed brace, S, substantially as described.

Third, The frames, A A, hung separately on one driving axle, B, so that they will rise and fall independently to suit the unevenness of the ground to be planted, and adjusted laterally to plant rows at different distances apart, and having equal and distinct seeding and planting devices which are thrown into and out of action separately to plant rows of different length, and in either alternate or opposite hills, all substantially as described.

1,105.—J. A. DeBrame, of New York City, for an Improved Baby Jumper:

I claim the combination of the tubular legs, a a, adjustable tubular standards, B B, springs, C, set screws, d d, and divaricated rods, D D, the whole being constructed and arranged and operating in the manner and for the purposes shown and described.

RE-ISSUES.

65.—E. W. Goodale, of Clinton, Mass., for an Improvement in Machines for Making Envelopes. Patented Oct. 9, 1855:

I claim, first, The employment, in a machine for making envelopes or bags, to support the blanks during either or all of the operations of pasting, stamping and applying the gluten, of a self-adjusting table, C, supported by a cam whose position is so controlled by a spring, or its equivalent, applied to its shaft that, as the blanks are removed one by one, the table is caused to rise to bring the next one to the proper hight or position to be pasted, stamped, or have the gluten applied, substantially as set forth.

Second, Giving the self-adjusting table a drop movement, substantially as described, by means of the cam, H, the lever, H′, pawl, k, ratchet wheel, I, or their equivalents, acting on the shaft of the supporting cam, C2.

Third, Applying the gluten, which makes the envelop or bag self-sealing, to that part of the blank which is to form the seal flap or closing flap of the envelop or bag, by a die, while in the machine, at the commencement of the process, substantially as described, whereby the said die serves the two purposes of applying the gluten, and of lifting the blanks, one at a time, from the pile, or retaining the top one while the remainder of the pile is lowered away from it.

Fourth, Applying the two dies, h h′, to two arms or jaws, i i, which are connected together by a hinge, or its equivalent, arranged at the rear of the table, C, and which have a sliding motion back and forth, substantially as described, to move the said dies out of the way of every successive blank till the latter has had the gluten applied and been separated from the pile, and then to bring them forward again to receive the separated blank and to receive the pressure of the screw, g, or its equivalent.

Fifth, Attaching the paste box, the gluten die and the screw, g, or other equivalent device, which gives pressure to the stamp which produces the seal to a head, E, receiving such a motion as is described from a pair of cranks, or their equivalents.

Sixth, The employment of a pair of nippers, O O′, having a motion of a positive length in the line, or parallel with the line in which the blank is required to move from the pasting to the folding apparatus, either to take a cut blank from a table or to draw the material before it is cut from a roll and measure off the proper length to be cut, substantially as set forth.

Seventh, The method of giving the necessary movements to the lappers, t1 t2 t3 t4, by means of the bent lever, u1 u2 u3 u4, and the springs, t5, applied to their hinges, substantially as described.

Eighth, The creasing fingers, w, arranged and operating substantially as described, to hold the blank in position and crease it in the line for folding the seal flap, substantially as set forth.

Ninth, The nippers, y y′, arranged and operating in a lateral direction, substantially as described, to remove the finished envelopes or bags at one side of the folding stand.

Tenth, The lifter, 10, applied substantially as described, to the folding stand, and operated by the lever which carries the nippers, y y′, for the purpose of lifting the finished envelop or bag at one side thereof from the stand to enable it to be taken by the nippers.

Eleventh, Applying a stamp, V, to work through the table. C, substantially as described, for the purpose of stamping a card or other impression on a bag during the process of manufacture.

Twelfth, The general arrangement and combination of the several working parts of the machine.

Thirteenth, And I further claim the cutting and folding of the paper in such manner that the lap for closing the bottom of the bag and a projection on one side of the mouth, affording convenience for opening the

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bag and constituting a flap to cover the mouth, are both produced by the form of the cut by which the paper is cut from the roll, substantially as described, without any waste of paper; but I do not wish to be understood as now claiming the cutting off the paper in such form as to produce only the projection at one side of the mouth, that being claimed in the re-issue, dated September 4, 1860, of my Letters Patent of May 29, 1855.

[This invention consists in certain novel devices and novel combinations and arrangements of known devices, the whole combining to constitute a machine of novel character by which a piece of paper of proper form may be made into a perfect envelop or bag, and which, by the addition of a curved knife for cutting the paper from the roll, and some mere modifications of its parts, may be made to cut paper from a roll, paste it, and form it into bags without any waste whatever. The invention also consists in so cutting and folding the paper as to make the bags complete without any waste, with one side of the mouth projecting beyond the other in such a manner as to afford facility for opening the bag and to form a lap for closing the mouth.]

66.—Huntley Bowman & Co. (assignees of Frederick Landon), of Brockport, N. Y., for an Improvement in Harvesters. Patented Nov. 13, 1860:

I claim the use of a traction lever connected with the axle of the drive wheel, or wheels, of harvesting machines, in such a manner as that the power of the team, in moving the machine forward, will insure a rolling motion of the drive wheel, or wheels, and a continuous action of the cutting apparatus, substantially as described.

67.—Huntley Bowman & Co. (assignees of Frederick Landon), of Brockport, N. Y., for an Improvement in Harvesters. Patented Nov. 13, 1860:

I claim, first, The combination of the frame, A, with the traction lever, D, and the axle, J, to secure an automatic adjustment of the cutting apparatus to undulations of the earth in its path consistently with the effect of the traction lever, D, substantially as described.

Second, The combination of the chain, r, and the projection, p, with the frame, A, the lever, D, and the axle, J, to secure a suitable adjustment of the cutting apparatus for harvesting grain consistently with the effect of the lever, D, substantially as described.

68.—The American Hoop Machine Company (assignees of Joseph Sawyer and Sylvester Sawyer), of Fitchburg, Mass., for an Improved Hoop Machine. Patented May 6, 1856:

We claim, first, The combination of the rests before and behind the cutting point with the yielding roll, L, when the former are on the side of the hoop to be dressed, and the latter bears upon the undressed or knot side, for the purpose set forth.

Second, The described combination of the rest, D, and the pressure roll, L, with the hollow-faced cutter head, C, operating in the manner substantially as set forth.

Third, The method described of tapering the hoop for the lap by means of the lever, T, and spring stop, O, operating in the manner and for purpose set forth.

69.—J. C. Tiffany, of New York City, assignee to himself and G. G. Heermance, of Hudson, N. Y., for an Improvement in the Means of Promoting Combustion in the Furnaces of Steam Boilers. Patented April 2, 1861:

I claim, first, The combination of a chamber or flue for the heating and transmission of air into a furnace above the fuel, with a perforated pipe therein to transmit steam mingled with the heated air through said chamber, so as to supply an amount of steam and heated air mingled together for the purpose of consuming the products of imperfect combustion evolved from the fuel, substantially as described.

Second, The method of combining and commingling the heated air and steam or gases liberated by the decomposition of steam in the heated chamber aforesaid, by which the draught through the chamber is essentially increased, and the mingled air and steam or gases liberated, as aforesaid, are thoroughly intermixed with the inflammable gases and cinders which pass off from the fuel unconsumed, and thus cause their perfect combustion, substantially as set forth.

Third, The combination of such heated chamber with its interior pipe, as described, with the furnace, at such part of the furnace as that the jet of heated air and steam of the gases liberated from the decomposition of steam may mingle with the unconsumed gases and cinders from the fuel, so that the flame arising from their combustion may come in contact with the surfaces of the boiler and flues, for the purpose and in the manner described.

Fourth, The combination of a regulated supply of heated air and steam in to the combustion chamber, so as to effect a perfect combustion of the unconsumed gases and cinders from the fuel, in the manner described.

Fifth, The construction of the chamber, f, as represented in Fig. 3, with the lugs and spikes, for the purposes and as set forth.

EXTENSIONS.

1,015,—T. B. Bleecker, of New York City, for an Improvement in Folding Bedsteads. Patented April 17, 1847; re-issued July 24, 1860:

I claim, first, The employment of a frame hinged in the center and connected to the two ends of a bedstead, for the purpose of folding the whole bedstead together endwise in the manner described.

Second, In combination with said folding frame, I claim the hook-shaped ends to the side rails, taking bolts attached to the posts and forming hinges at these points for folding the hinged frame or allowing said frame to be disconnected from the posts, as specified.

Third, In combination with said frame hinged to the center, I claim the pendent legs, Fig. 9, and the braces, k, for the purposes and as specified.

664.—Thomas Brown, of London, England, for an Improved Arrangement of Means for Working and Stopping Chain Cables. Patented July 25, 1854; ante-dated April 20, 1847; re-issued March 25, 1856; again re-issued Feb. 15, 1859:

I claim the flaring and radially flanched annular recess in the capstan of working a cable of any given size or cables of several different sizes, the same being constructed and operating in the manner and for the purposes substantially as set forth.

I also claim, in combination with a capstan, a windlass which is capable of working a chain cable when only a partial turn is taken, a set of removable rollers, so arranged in relation to the capstan, the deck pipes and hawse holes, that either a port or starboard chain cable can be continuously hove in by means of said capstan and rollers, and can be directly run out of its locker without any previous overhauling, substantially as set forth.

I also claim the described arrangement of bow stopper and after stoppers, whereby more cable can gradually and controllably be given to a vessel while riding heavily at anchor, substantially as set forth.

I also claim the clearing guide, in combination with the annular recess of a capstan or windlass, which is capable of working a chain cable when only a partial turn is taken, for the purpose and in the manner substantially as set forth.

NOTE.—The above list of patents contains TWENTY-SEVEN which were obtained through the Scientific American Patent Agency.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

BINDING.—We are prepared to bind volumes, in handsome covers, with illuminated sides, and to furnish covers for other binders. Price for binding, 50 cents. Price for covers, by mail, 50 cents; by express or delivered at the office, 40 cents.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application to this office. Address MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

J. R. C., of Conn.—Flat irons have been made with detachable handles, but your arrangement is different from any that we have seen, and we think a patent may be obtained for it. If you desire us to make an application for Letters Patent, please send us a small model with first installment of government fee of $15, and we will take the case in hand at once.

W. H. G., of R. I.—A fly blister may remove the mark of India ink from the flesh; but we have never had occasion to try the experiment.

M. M., of Mo.—So far as we know, lard oil cannot be obtained without submitting the lard to pressure.

L. S. U., of Tenn.—Ultramarine, carmine and other colored wooden boxes are first painted the desired color, then rubbed down, varnished and polished in the same manner as common cabinet work. You will find a description of the methods of manufacturing lenses in "Brewster's Optics."

C. C. H., of Ill.—The "American Miller," &c., is published by H. C. Baird, of Philadelphia, Pa. It is a work of some merit, but not regarded as up to the times.

H. F. W. of C. W.—If you apply any color in liquid to a sheep skin after it is finished, you will destroy the dress put on its surface by the roller. A very strong solution of cochineal, containing a little dissolved cream-of-tartar and a few drops of the muriate of tin, makes a bright red color on leather. A varnish composed principally of boiled linseed oil containing some sulphate of zinc, is used for making enameled leather and cloth. You may put it on in coats with a brush or sponge; it must be dried in an oven heated to about 160°, at least.

J. A. G., of Conn.—The explosive force of a fulminate does tend downward when there is nothing to obstruct its upward expansion. The gases tend in all directions alike; but more in that one in which there is the least resistance. It is said that fulminating mercury, laid upon a block of iron and exploded, will make a dent in the iron. Colors which have been faded with sunlight will never gain their original beauty by keeping them in a dark room. Solar light completely changes the chemical character of the atoms which produce such colors.

S. R. K., of Mich.—A good cement for rendering your brick roof watertight may be made with linseed oil, red lead and fine white sand or ground glass. Use about 10 per cent of the red lead to the sand, and sufficient oil to render it plastic.

T. W., of Mass.—We do not know what you mean by coloring copper water tanks; but if you desire to render the copper clear and beautiful by removal of black oxyd, this can be done easily by applying dilute muriatic acid with a sponge to the surface of the metal. Wash well afterward with warm water. Polished copper is very beautiful, but it soon becomes tarnished when exposed to the air. If you give it a thin coat of clear copal varnish, it will prevent the action of the moist atmosphere upon the copper, and keep it bright for a long period.

H. G., Jr., of N. Y.—A wagon wheel moves a little faster at the top than at the bottom. See an illustrated explanation of this subject on page 131, Vol. XIV. (old series), SCIENTIFIC AMERICAN.

I. B., of Va.—Coal oil will dissolve gutta-percha, india-rubber and the common resins of which varnishes are made. We scarcely know what substance to recommend for experiment to coat your coal oil barrels to prevent leakage. A very thin paste of plaster-of-paris, made up with warm water containing some glue in solution, may answer a good purpose.

E. M., of N. Y.—We do not know where you can obtain Archillos' processes for plating with alloys.

S. D. P., of Tenn.—It will take 1,100 gallons of water per minute on an overshot wheel, of 30 feet diameter, to give 10 nominal horse-powers.

S. K. S., of Ga.—Persons residing in the Confederate States can obtain patents, the same as usual, by taking the customary oath that they are citizens of the United States. We are in the constant receipt of papers pertaining to applications for patents from residents of the seceded States bearing the required affidavit. Patriotism is therefore not wholly obliterated at the South.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, April 20, 1861:—

R. G., of Conn., $25; H. N. D., of Cal., $25; G. M., of Ill., $25; S. Z. S., of Pa., $15; W. B. S., of N. Y., $15; S. S. H., of Maine, $10; O. G. B., of N. Y.. $15; J. A., of Mich., $25; J. H. E., of Pa., $15; G. L., of N. Y., $40; J. & G., of Wis., $15; J. S. P., of Conn., $10; Van W. & M., of N. J., $25; A. C., of Mass., $15; W. Y., of N. Y., $15; M. S. P., of Mass., $25; L. M. S., of N. Y., 30; J. S., of Ohio, $10; W. D. W., of Mich., $15; J. P. B., of S. C., $15; W. F. V., of Ohio, $25; H. K., of N. Y., $25; S. H. & M. C. W., of Mass., $25; J. N., of N. Y., $20; C. F. M., of Maine, $10; F. F., of N. Y., $25; R. H., of N. Y., $15; D. O. F., of Mass., $25; F. & S., of N. Y., $25; C. & S., of N. Y., $30; S. & R. W. C., of Ohio, $25; J. A. De B., of N. Y., $93; T. J. L., of Pa., $25; J. R. McD., of Mo., $20; J. H. M., of Mich., $15; A. H. F., of Ill., $10; A. J. S., of Ill., $30; C. & W., of N. Y., $10; A. D., of N. J., $15; W. F. S., of N. Y., $25; T. P., of Ill., $25; W. W., of N. Y., $15; G. R., of N. Y., $40; J. E., of Cal., $30; A. K. T., of Mich., $25; C. & W. R., of Mass., $25; L. C., of Mass., $15; S. C., of N. Y., $10; N. C., of N. C., $15: C. L. C., of Iowa, $15; W. M., of Mass., $25; M. C. B., of N. H., $10; J. B., of Ind., $15; J. W. P., of Ind., $15; S. H. B., of Conn., $40; A. B., of Va., $15; E. M., of N. Y., $35; S. A. B., of N. Y., $15; T. P., of N. Y., $10; G. M., Jr., of Ill., $25; E. S., of Mass., $25; S. D. C., of Iowa, $10; J. B. McM., of N. Y., $100; G. G. G., of Conn., $15; E. Z. C., of N. J., $15; T. H. & H. J., of N. Y., $15; N. E. D., of Ill., $10; J. H., of N. J., $12; P. P., of N. Y., $20; H. & S., of Pa., $50; R. & W., of N. Y., $25; B. T. B., of N. Y., $82; D. E. S., of Maine, $25; E. H. C., of Mich., $25; C. H. B., of Pa., $40; J. C. & C. N. M., of Ill., $10; J. H. M., of Vt., $15; A. M., of N. Y., $25; R. W., of Pa., $15.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending April 20, 1861:—

J. S. McC., of N. Y.; B. T. B., of N. Y. (2 cases); W. M., of Mass., M. C. B., of N. H. (3 cases); N. J., of N. Y. (2 cases); J. A., of Mich.; D. O. F., of Mass.; D. E. S., of Maine; S. D. C., of Iowa; R. H., of N. Y.; C. B., of N. Y.; R. G., of Conn.; F. & S., of N. Y.; M. S. P., of Mass.; G. W. D., of Ohio; H. N. B., of Iowa; W. F. S., of N. Y.; J. A. DeB., of N. Y. (2 cases); R. S., of N. J.; G. M., of Ill.; S. S. H., of Maine; H. N. D., of Cal.; F. F., of N. Y.; V. & M., of N. J.; J. S. P., of Conn.; J. E., of Cal.; A. & E., of Texas; J. H., of N. J.; P. P., of N. Y.; J. S., of Ohio; A. H. F., of Ill.; L. M. S., of N. Y.; N. E. D., of Ill.; E. H. C., of Mich.; A. J. S., of Ill.; G. B., of Sardinia.

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Thirty Cents per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

CHANGE IN THE PATENT LAWS.

NEW ARRANGEMENTS—PATENTS GRANTED FOR SEVENTEEN YEARS.

The new Patent Laws, recently enacted by Congress, are now in full force, and promise to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, except in reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submitit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent, &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this Office, and as a measure of prudence and economy, we usually advise Inventors to have a preliminary examination made. Address MUNN & CO., No. 3 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row New York.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed, for the Patent Office. These should be securely packed, the Inventor's name marked on them, and sent, with the government fee, by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park-row, New York.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, inclosing the official letters, &c.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the re-

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quirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Interferences.

We offer our services to examine witnesses in cases of interference, to prepare arguments, and appear before the Commissioner of Patents or in the United States Court, as counsel in conducting interferences or appeals.

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The Validity of Patents.

Persons who are about purchasing Patent property, or Patentees who are about erecting extensive works for manufacturing under their Patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing Patent, before making large investments. Written opinions on the validity of Patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars, address MUNN & CO., No. 37 Park-row, New York.

Extension of Patents.

Valuable Patents are annually expiring which might be extended and bring fortunes to the households of many a poor Inventor or his family. We have had much experience in procuring the extension of Patents; and, as an evidence of our success in this department, we would state that, in all our immense practice, we have lost but *two* cases, and these were unsuccessful from causes entirely beyond our control.

It is important that extension cases should be managed by attorneys of the utmost skill to insure success. All documents connected with extensions require to be carefully drawn up, as any discrepancy or untruth exhibited in the papers is very liable to defeat the application.

Of all business connected with Patents, it is most important that extensions should be intrusted only to those who have had long experience, and understand the kind of evidence to be furnished the Patent Office, and the manner of presenting it. The heirs of a deceased Patentee may apply for an extension. Parties should arrange for an application for an extension at least six months before the expiration of the Patent.

For further information as to terms and mode of procedure in obtaining an extension, address MUNN & CO., No. 37 Park-row, New York.

Assignments of Patents.

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It would require many columns to detail all the ways in which the inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

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BURLEY'S DOVETAILING MACHINE.—THE INVENtor wishes to dispose of his English and French patents for improvements on this machine, for the value and usefulness of which he refers to the opinions expressed in the following letters from Colonel Craig, United States Ordnance Department, Washington, and the Hon. Jos. Holt, ex-Commission of Patents, formerly Secretary of War:—

[Extract of letter From Colonel Craig, United States Ordnance Department, Jan. 18, 1861]:

"Two of these machines have been in use some time in shops at our arsenals, where they are regarded as very valuable labor-saving machines, that could not be dispensed with without great inconvenience and loss. Since these were purchased, Mr. Burley has made improvements that have increased their usefulness, &c."

The Hon. Jos. Holt, formerly Secretary of War, says, in a letter of Feb. 15, 1861:—

"I concur fully in the views expressed by Colonel Craig in his report under date of the 18th of January. The machines are no doubt valuable; and if they can be regarded as properly embraced under the term 'military supplies,' as employed in the third section of the act approved June 23d, 1860, then the interests of the service require that authority to purchase them should be granted by law."

Other letters of high recommendation can be shown from officers both of the War and Navy Departments. For further particulars, address THOMAS H. BURLEY, No. 195 Sixth-avenue, New York. 1*

THE GRAEFENBERG THEORY AND PRACTICE OF Medicine.—On the first day of May, 1860, the Graefenberg Company's Salesrooms, Consulting Offices and Medical Institute were removed from No. 34 Park-row to

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TO ARCHITECTS.—THE BOARD OF SUPERVISORS of Kings county, having resolved to build a Court House for said county, the undersigned, by authority and on behalf of said Board, hereby invite architects who desire to compete for prizes to submit plans on or before 12 o'clock noon, on or before the third day of June next, to be deposited with A. H. Osborn, Clerk of said Board, at his office, No. 355 Fulton-street, Brooklyn.

The prizes will be $250 for the first; $125 for the second; $75 for the third; and $50 for the fourth; to be adjudged by the Board of Supervisors; they reserving the right to reject all, or to adopt portions of all those to whom premiums may be awarded.

Circulars giving the location and a diagram of the ground, the required accommodations to be provided in said building, together with the rules to be observed by those presenting plans for competition, may be procured of said clerk, or of either of the undersigned.

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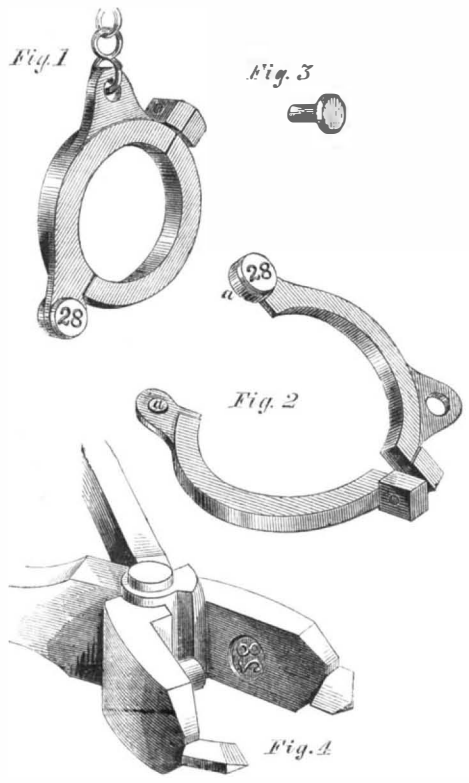
LYONS' IMPROVED LOCK SEAL.

The accompanying engravings represent an improvement in lock seals, invented by Mr. J. H. Lyon, of this city. The object of these seals is to guard mail bags, freight cars, &c., from the depredations of dishonest employés; the lock being guarded by a leaden seal which it is necessary to break in order to open the lock.

Fig. I represents a perspective view of the lock, closed and sealed. It is made of malleable cast iron, with a hinge to open laterally, as shown in Fig. 2. When thus opened, it is hooked into the staple in the



manner of an ordinary padlock; the ends are then brought together, and a leaden bolt, Fig. 3, is inserted into the holes, *a a*, Fig. 2, and riveted by means of the pliers, Fig. 4, which at the same time press a number (twenty-eight is shown in the engraving) or other device upon the head of the bolt. As it is necessary to sever the leaden rivet in order to open the lock, and as a thief would have no means of closing and stamping it again in the same manner, the evidence of his depredations would be preserved. Officers at the proper places are furnished with the tools, Fig. 4, for opening and closing the locks.

These efficient guards against the depredations of dishonest employés have been adopted on several of our railroads, where they are giving great satisfaction.

The patent for this invention was procured, through the Scientific American Patent Agency, on Oct. 16, 1860; and further information in relation to it may be obtained by addressing Lyon & Spaulding, No, 2 Astor House, New York city.

SALT WATER SEAS AND FISH BECOMING FRESH IN CONSTITUTION.—A paper was read recently at the French Academy of Sciences, by M. Babinet, on the diminution of salt in certain seas. Those inland seas, like the Euxine, which are constantly receiving fresh water from rivers, while their salt is constantly flowing out by some outlet, such as the Bosphorous, will in the course of time be transformed into fresh water lakes. This has been the case with Lake Baikal, in Siberia, the waters of which were once salt, but are now almost as pure as distilled water. During this process, which has taken ages to accomplish, the fish which were indigenous before have continued so, although the water is so much changed. There are herring and seals in the lake, which are similar to those in the salt Polar seas. M. Babinet concludes, therefore, that herring and seals may be acclimatized in fresh water rivers and lakes. Why not have some of the latter in our Central Park ponds, in this city?

A CURIOUS little steamer has been lately fitted up at Greenock, Scotland, with a rotary engine and a paddle propeller, which also serves for a rudder. It will never cover its inventor with laurels.

The Course of Revolutions.

Hon. Alexander H. Stephens, of Georgia, is the author of the following truthful remarks. They may be pondered now by all lovers of the country with solemn interest:—

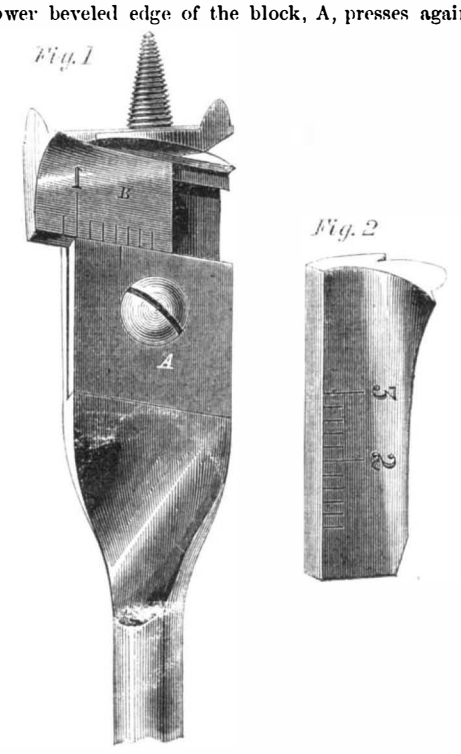
Revolutions are much easier started than controlled, and the men who begin them, even for the best purposes and objects, seldom end them. The American Revolution of 1776 was one of the few exceptions to this remark that the history of the world furnishes. Human passions are like the winds; when aroused they sweep everything before them in their fury. The wise and the good who attempt to control them will themselves most likely become the victims. This has been the history of the downfall of republics. The selfish, the ambitious and the bad will generally take the lead. When the moderate men who are patriotic have gone as far as they think right and proper, and propose to reconstruct, then will be found a class below them governed by no principle but personal objects, who will be pushing matters further and further, until those who sowed the wind will find that they have reaped the whirlwind.

The letter, from which this is an extract, was written by Mr. Stephens before the Revolution in the Cotton States had taken place, and with a view to counteract its progress, He is now Vice-President of the Confederate States, and may live long enough to witness a sad realization of his theory.

CLARK'S EXPANSIVE BIT.

The convenience of the expansive boring bit, from the cheapness with which it enables a farmer or mechanic to supply himself with a set of augurs, and the ease with which such a set can be carried, is causing its extensive introduction; and this large demand is stimulating inventors to make improvements in its construction. The bit here illustrated commends itself by the simplicity of its parts, the ease with which the sliding cutter can be adjusted, and the firmness with which this cutter is held in the shank.

A lipped augur or boring bit is made with a depression in one side, as shown in Fig. 1. In the upper part of this depression, a block of steel, A, is secured by a screw. The lower part of this block is beveled, so as to leave the remaining portion of the depression or groove of a dovetailed shape, and into this groove the cutter, B, is fitted to slide. The form of this cutter is shown in Fig. 3. By turning the screw, the lower beveled edge of the block, A, presses against



the cutter, B, holding it, with great firmness, in its place. The cutter, B, is graduated as shown, so that it may be readily set to bore a hole of any size desired. A bit of the size represented in Fig. 1, with two sliding cutters, will bore holes of any diameter from ½ to 1⅝ inches; and those of the second size, which take a cutter like that represented in Fig. 2, will, with two cutters, bore holes from ⅞ to 3 inches in diameter.

The inventor of this improvement is William A. Clark. It is secured by patents, dated May 11, and Sept. 28, 1858. The implements are manufactured by W. A. Clark & Co., of Westville, Conn., to whom inquiries for furthur information may be addressed.

Salem, the capital of Oregon, has one woolen manufactory, an iron foundry, and a steam saw mill.

OUR NAVY FOR BLOCKADE.—In our last number we gave a succinct account of the condition of our navy, with special reference to its efficiency for offensive and defensive purposes. We showed that only steam vessels of war could be relied upon for the fullest measure of success, and that we had really but 386 guns. For the purposes of a blockade, which it is the alleged intention of the government to establish in all the Southern ports, every war vessel will be available, as the Southern States have no navy to resist; in some cases, therefore, one vessel of war will suffice to close a port of entry.

IRON-PLATED SHIPS.—We publish, on another page, a lengthy communication from Captain Dahlgren, of the United States Navy, on the subject of iron-plated ships. It forms part of a communication from the late Secretary of the Navy—Mr. Toucey—to the Speaker of the House of Representatives. We commend it to the perusal of our readers as a subject of special interest at this time.

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FROM THE STEAM PRESS OF JOHN A. GRAY.

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